THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

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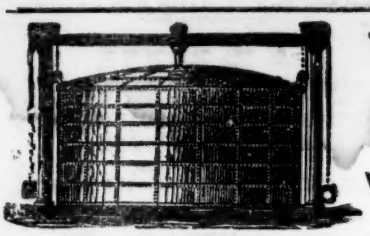

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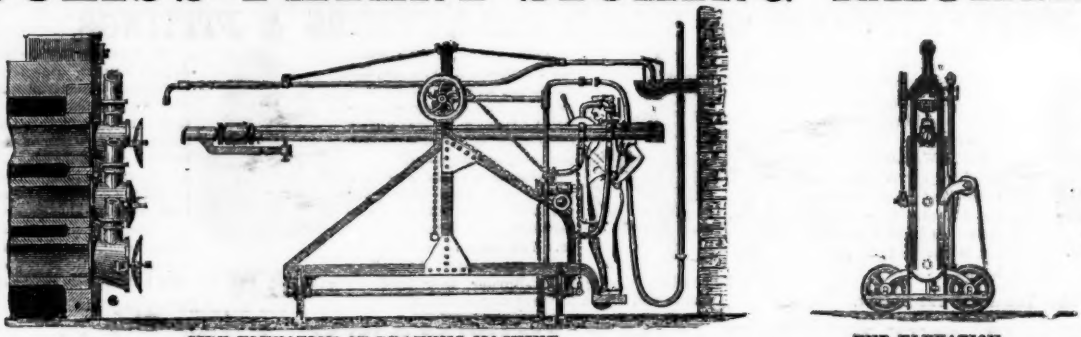

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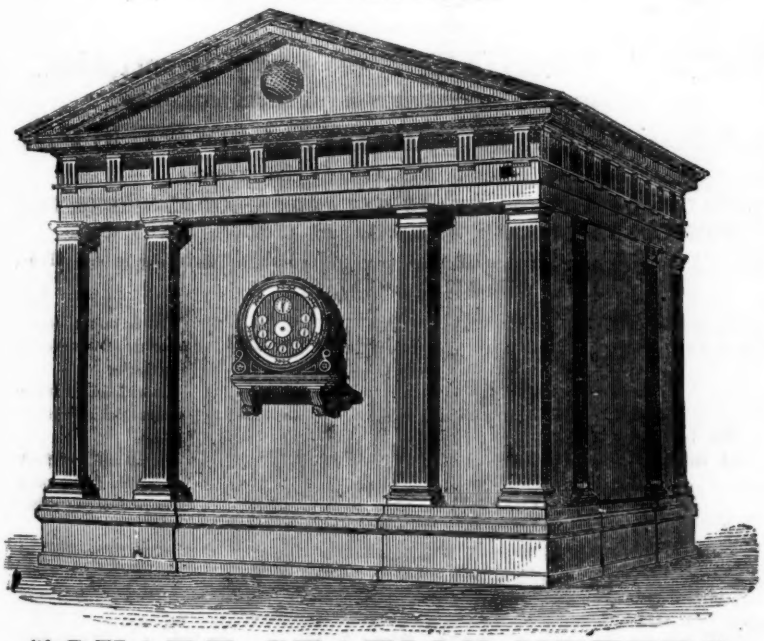

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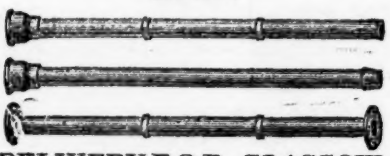

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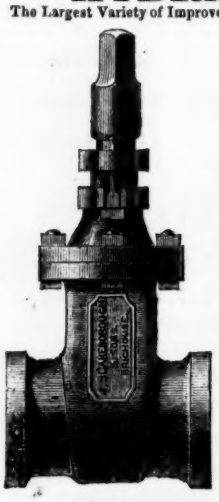

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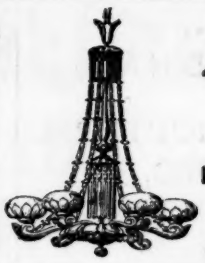

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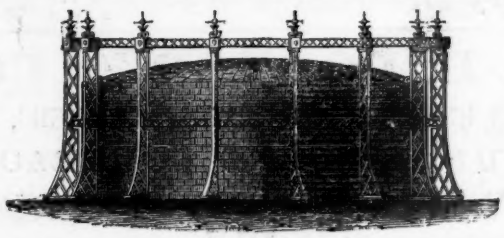
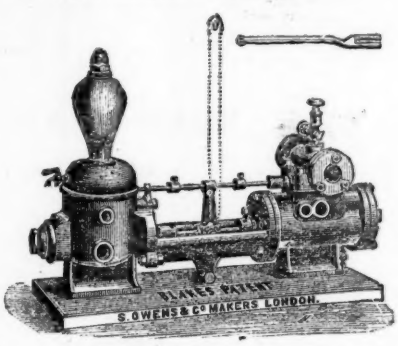
TABLE GLASS OF ALL KINDS,
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,
WHITEFRIARS STREET, LONDON, E.C,
HYDRAULIC ENGINEERS,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 10,000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.
PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

TANGYE BROTHERS AND HOLMAN,

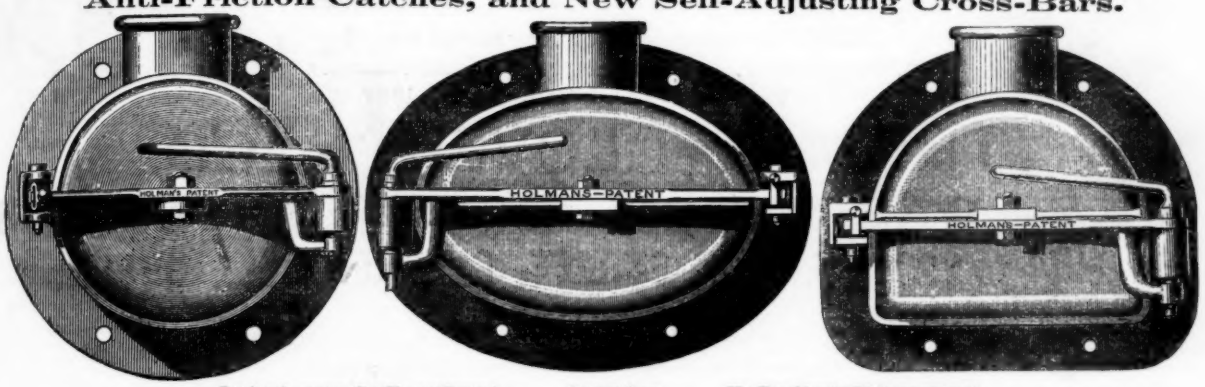
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

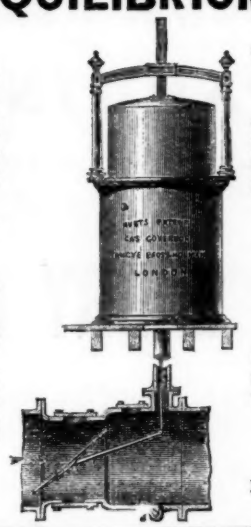
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France). Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

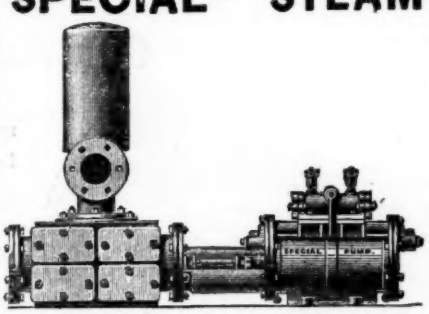
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

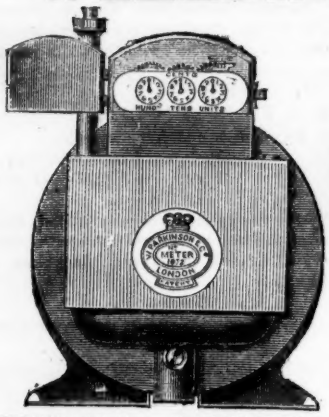
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816.)

MANUFACTURERS OF

WET & DRY METERS,

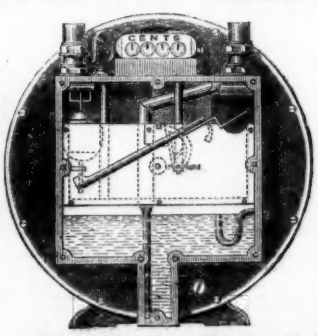
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

BRITISH ASSOCIATION OF GAS MANAGERS.—*Amongst the communications received, and which, in the exercise of the best judgment we could form on the subject, it has not appeared desirable to publish, was one from a Midland Counties Manager. Our decision has not given satisfaction to him, and he thus writes: "The Committee of the Association are not only sufficiently powerful to prevent open discussion of their policy, but also potential in closing the columns of the* JOURNAL OF GAS LIGHTING *to its subscribers." We make no further reply than to say, that the insinuation is perfectly groundless, and is as insulting to the Committee as it is to us.*

J. H., Glastonbury.—*Sewer-gas mixed with air is explosive, but in all probability, in the case you mention, there was a leakage of coal gas into the sewage-tank. It would not require a light applied in the immediate vicinity of the tank, for flame will "back" a long distance. Without a flame there could have been no explosion.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 26, 1878.

Circular to Gas Companies.

WE were led to speculate that the Board of Trade intended to try and amend Metropolitan Gas Legislation by introducing a general measure to alter the penal clauses of recent special Acts. It appears no such intention is entertained, for this session at all events; and, therefore, the Gas-Works Clauses Amendment Bill will be the only measure relating to gas which the Government will introduce at present. We have already pointed out what may possibly be the effect of Section 40 of the Bill above named. As it stands, we may take it that, construed, like the Act of 1871, to apply to all existing statutory Gas Companies, the section which we have named will give a Magistrate discretionary power to mitigate the penalty when a Gas Company are convicted of any default. If our construction be held to be good, we shall remain perfectly content; but if any immitigable fine be inflicted, which is to go into the pocket of the Metropolitan Board, we shall continue to object, and urge upon the Government the propriety of introducing an amending Bill. We have recently pointed out that offences may differ so essentially in degree that it would be the height of injustice to inflict a fixed penalty for every defect; it is gratifying, therefore, to find that the Board of Trade take a sensible view of the matter, and are not disposed to pander to the selfish propensities of the Metropolitan Board of Works.

To report the accounts of a Metropolitan Gas Company is now, happily, to record only a continued success. The report of the London Gaslight Company is no exception. The statement made by the Directors is, that after providing for interest on mortgages, and dividends on preference shares, there remains a net profit which allows of the declaration of maximum dividends on all classes of ordinary stock and share capital, leaving a balance of over £4000 to be carried to the reserve-fund. This fund has now reached the respectable amount of £48,000, equal to the payment of more than the year's dividends. In spite of reductions, which have benefited the customers of the Company to the extent of over £15,000 per annum, the Company's profits still increase, and we hope they may continue to do so.

We have received the report of the Directors and the statement of accounts of the South Metropolitan Gas Company for the past half year. The balance applicable to dividend on the ordinary share capital is £39,432, which, as the Company charged but 3s. 2d. per thousand cubic feet, while their initial price is 3s. 6d., allows the division of eleven per cent., which the Directors accordingly recommend. It has been decided to reduce the price of gas, from the beginning of the year, to 3s., so that next half year the Company may divide eleven and a half per cent., if they can earn it with the reduced price. Prosperity such as is here indicated is almost unparalleled in the history of statutory gas undertakings.

The half-yearly report of the Directors of the Phœnix Gas Company has also just been issued. The net revenue of the half year was £46,266. Out of the available net revenue the Directors recommend a dividend at the rate of ten per cent. on the £20 fully-paid shares, as well as dividends on the £20 new shares (on £6 of the £16 paid), on the capitalized stock paid in full at five per cent., and on the new stock (seventy per cent. paid) at seven and a half per cent., leaving £5035 to be carried forward. We are glad to see that the reduction of price in October last has had a favourable effect, the consumption showing an increase.

The Alliance and Dublin Gas Company again divide ten per cent., and carry forward a large balance. We shall refer again to this Company, when we have the full accounts before us.

The Sheffield United Gas Company are, of course, prosperous. They pay maximum dividends on all classes of stock and shares, and have a balance of over £14,000 to carry forward, which leaves them with a high reserve. It is worthy of mention that the price of gas has been reduced since the beginning of this year from 2s. 10d. to 2s. 9d. per thousand feet—a step fully

justified by the abstract of accounts now published. A good deal of noise has recently been made in the Sheffield Town Council about "Nominee Directors," and some gentlemen who do not enjoy the distinction have endeavoured to represent that such appointments are a farce. They may or may not be a farce; but, if they are, it is simply the fault of the Directors so nominated. They are, of course, in a minority on the direction, but minorities have the power of making their existence and influence known and felt; and we are satisfied that the gas consumers of Sheffield have no reason to regret the appointment of "Nominee "Directors." The suggestion that they are in collusion with the Company's Directors is a pure scandal.

The Sheppy Gas Company have had a prosperous half year, and pay maximum dividends, carrying forward a fair balance. The Directors are about to take a step which we consider eminently judicious. They do not reduce the price of gas directly, but they offer all consumers a discount for prompt payment of accounts, which will, virtually, be equal to a reduction of threepence per thousand feet. Our readers have been informed of the various steps which the Sheppy Gas Company have taken to popularize and increase the consumption of gas, and we are happy to congratulate them upon having achieved some success in this direction. Perseverance is, however, necessary, for we notice that the increase has only amounted to twenty-nine per cent. in seven years; this is below the normal amount in a growing locality.

The Gas Committee of the Corporation of Birmingham publish a statement, which will be found on another page, showing the comparative cost of the manufacture and distribution of gas in the last year of the two Companies existence—1875—and subsequently under the *régime* of the Corporation. The comparison is hardly fair, for the Companies were, at the period named, just emerging from difficulties. The Corporation, it is quite true, have effected many economies, and have made large profits; but the Birmingham consumers cannot be congratulated upon the result. It is quite certain that gas should be cheaper in Birmingham, and there are many in the borough who share our opinion on this matter. We may leave the question, however, for, as out-townships emancipate themselves in the course of another two or three years, when the supply of little more than Birmingham proper will only have to be considered by the Corporation, no doubt a considerable alteration in the state of affairs will take place. The high prices now paid by some of the out-districts will no longer be available, but, at the same time, a considerable amount will be written off the capital account of the Corporation. In time, no doubt, the Birmingham consumer will gain some advantage; at the present moment his condition cannot be considered apart from that of his neighbours.

It may now, we think, be taken for granted, that the works of the Exeter Gas Company will soon pass into the hands of the Corporation. These latter will thus have the opportunity of showing whether they can manage matters so well as to prevent such complaints as have been constantly brought against the Gas Company for the last two or three years. It is true that Local Authorities enjoy an immunity from persecution which is not accorded to commercial bodies. We expect that the disappearance of the Company will not be much regretted in Exeter. The Shareholders will, no doubt, be satisfied with the price they will obtain for their property, and the citizens will look cheerfully forward to gas manufactured without causing a nuisance, and sold at a cheaper rate. The terms offered by the Corporation are those now usually accepted, unless under special and particular circumstances—viz., annuities equal to maximum dividends, redeemable at twenty-five years purchase, the Corporation to take over the mortgage debt of the Company, leaving them the reserve-fund. It is proposed that clauses to give effect to the arrangement, if concluded, shall be inserted in the Company's Bill, now in the Commons, and the Corporation shall take possession of the undertaking on Midsummer-day next.

Terms for the sale and purchase have been arranged between the Bangor Local Board and the Gas and Water Company. The Shareholders are to have ten per cent. on all the subscribed capital, redeemable, as usual, at twenty-five years purchase. There is nothing unusual in the other provisions. Great expectations are entertained of the transfer. It is thought that in the course of a few years the Local Board will make, at least, a thousand a year profit, which, expended for public purposes, will do great things for Bangor.

Perhaps it would not be well to be too confident about profits, for it is not every Local Authority that realizes them. There is the Corporation of Richmond, Yorkshire, for instance, who have had a gas undertaking for a great number of years, and their balance-sheet for the past years, succinctly put, stands thus:—Receipts, £1644; expenditure, £2561; showing a deficiency of £917. How this is to be made good we are not informed. The Corporation of Richmond must, we fear, be an *unreformed* body.

A case occurred at Portsmouth the other day, which well exhibits the propriety of allowing discretionary powers to Magistrates. The Portsea Island Gas Company are required to supply gas of 14-candle illuminating power; but on three days last November the Corporation Examiner reported the gas as below the standard. The deficiency does not seem to have been much, the lowest experiment showing 12·6 candles. It appeared from a report laid before the Magistrates, that the average quality of the Company's gas supplied was 15¼ candles, and was sometimes as high as 17 and 18. For the deficiencies, which occurred last November, the Corporation prosecuted the Company in the past week. The defence of the Company was that the deficiency occurred from unavoidable causes; and after some rather strong remarks by the sitting Magistrates on the unreasonable delay, the Corporation withdrew the summonses. If they had not been withdrawn, we feel satisfied that the Magistrates would not have convicted under the circumstances.

The abstract of accounts published by the Corporation of Wigan states that, during the past year, the profit made on the gas undertaking amounted to £13,929 10s. This represents a very different state of affairs to that drawn by Mr. Templeton, and we may express a hope that the Gas Committee are right in their calculations.

There is, no doubt, a future for the Imperial Water and Gas Corporation, Limited; but we hope that no great delay will be experienced in commencing real business. We are happy to see that the Directors have several proposals before them. England is now pretty well studded with gas-works, but much remains to be done for the supply of water. Unhappily, water-works are, as a rule, less remunerative than gas-works; but in these days investors have to be content with small interest. We are inclined to think one of the most promising fields for the Company's operations is, as they propose to assist Local Authorities, in the institution of water-works. A small staff of Engineers, well acquainted with the hydrology of England, would be of the greatest service.

Water and Sanitary Notes.

The adjourned debate on the second reading of the Metropolis Water-Works (Purchase) Bill now stands adjourned until the 4th prox., which happens to be the evening on which the Chancellor of the Exchequer makes his financial statement. We do not know who is responsible for this stupid blunder; but, after all, there may be a reason for it, and we recommend the friends of Water Companies to be in their places. The House on these occasions, as a rule, empties quickly after the Chancellor of the Exchequer sits down; and the addition to the income-tax, which the Chancellor will probably have to announce, will perhaps have the effect of making Metropolitan Members, at all events, consider whether, or not, they are inclined to have their rates increased along with the income-tax.

The Corporation of Liverpool, in deference to the persistent efforts of Alderman Bennett and a small following, have begun to deepen their well at Bootle, with a view to tap the subterranean lake which the worthy Alderman and his friends suppose to exist at an uncertain depth. According to the last report, the borers have penetrated to the depth of 701 feet, but have not yet tapped the lake, or come upon any water-bearing stratum which can add much to the resources of the Liverpool Corporation.

The Thirlmere scheme of the Manchester Corporation is still under the consideration of the Committee of the Commons, but we hope it will be settled before the recess. So far as we have been able to observe, the evidence on the part of the opponents of the scheme has been extremely weak, and we hope sincerely that the Manchester Corporation will carry their scheme. Liverpool will, next year or the year after, have to come forward with a grand scheme (we take it as a matter of course that the wells scheme will fail), and presently England and Scotland will have water undertakings worthy of their wealth.

In obedience to a motion made by Sir U. Kay-Shuttleworth, a return has been made to the House of Commons of a report, by Dr. Frankland, on the state of the Metropolitan Water Supply during the year 1877. Like all that the author has written on the subject for the last few years, this report is strongly condemnatory of the Thames and the Lea as sources of supply. Still, however, he is fain to admit that, during the period over which his observations have extended—viz., the last ten years—the Companies have made great improvement in the condition of the water they furnish. Turbidity is now rarely seen; organic matter has been greatly diminished in amount; living and moving organisms are getting very scarce; and, indeed, the only bugbear now left is "previous sewage contami-

"nation," a species of mystification of which we hoped we had heard the last.

One object of the report seems to be to call attention to the waste of water flowing from springs in the chalk, which eventually finds its way to the Thames, according to Dr. Frankland, even after protracted drought, and runs over Teddington Weir at the rate of 350 million gallons a day. Dr. Frankland asks if it be impossible for engineering skill to impound this bountiful supply of pure potable water for the domestic service of the Metropolis.

Parliament has rapidly disposed of the Gas and Water Bills this year, and, unless the Metropolis Water-Works (Purchase) Bill should obtain a second reading, there will remain no measure for consideration after the Easter recess. In the House of Commons, the Cheltenham Water Company's Bill has been reported, "Preamble not proved." As we write, the measure promoted by the Corporation is still in the balance. The result will, no doubt, be the speedy transfer of the Company's undertaking to the Corporation. The two Scarborough Water Bills have been passed as unopposed measures by Mr. Raikes, Chairman of Committees. This, of course, indicates that the works of the Company are for sale, and will be bought.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

GAS PROPERTY, GAS ENGINEERS, AND THE YORK GAS COMPANY.

Sir,—If it be so "very fine to see one's name in print," I cannot feel too much obliged to your correspondent, "A Gas Shareholder," for having so liberally studded a column or more of your valuable space with mine. Still, however much indebted I might have felt, I had not intended taking any notice of his letter until yesterday, when it came to my knowledge that it had been reprinted and widely circulated in a separate form, with the object, as it appears to me, of bringing discredit upon my professional sincerity. And it is only on that account that I ask you to favour me by inserting a reply.

Your correspondent's first objection to my advice to the York Council is, that I recommended a maximum price should be insisted upon, which should introduce an element of risk such as would necessitate enterprise, economy, and efficiency on the part of the Company. This proposition appears to me so reasonable, that I am simply amazed that any man in his right mind should dissent from it. Yet "A Gas Shareholder," aghast at such a revolutionary idea, finds ordinary type inadequate to express his astonishment, and resorts to italics. Talk not to such a man of enterprise and economy, for he is disquieted at the bare suggestion. For my own part, I have never conceived that the privileges granted by Parliament to Gas Companies were given, except out of regard to *public* interests.

In the next place, I have given offence by suggesting that the Company should accept such an addition to their powers, in regard to capital, as would suffice to meet their requirements for ten years. By reference to the Company's accounts, I had ascertained that the rate of expenditure on capital account for the past ten years had been £1000 per annum, and, therefore, I consider I was not illiberal in stating £20,000 as a fair sum to adopt.

I quite agree with "A Gas Shareholder," that where the rate of interest on capital employed in gas enterprise is but 5 per cent., or even less, there is little inducement to reckless expenditure; and I distinctly stated this fact in my report, though your correspondent has not had the candour to admit it.

As to the fairness of revising the conditions between Companies and Consumers at intervals of ten years, I fail to observe anything irrational in the idea, especially as no Company or Corporation whom I have ever served have escaped the necessity for an amended Act over a longer period.

Your correspondent then refers again to the question of maximum price. I had stated that an addition of 10 per cent. to prices current before the coal famine sufficed to yield the maximum dividend. "Where?" demands your correspondent. "Let Mr. Woodall—or anybody else—reply." At Burslem, I reply, and what I did myself I have little doubt many others were equally successful in accomplishing.

There I never had a contract for coals extending over more than one year, and during the severest of the panic, my contract did not cover more than half my requirements; in consequence of which I was compelled to pay pit prices as they advanced, to occasionally limit manufacture, and to import coals from out-of-the-way districts.

The prices of gas were 3s. 2d. and 3s. per 1000 before the famine, and were raised to 3s. 6d. and 3s. 4d., which increase was, as I stated, about 10 per cent.

Now, I might have paid still higher prices for coal, and still maintained the dividend, had I drawn upon the reserve-fund. But I had no occasion to touch it, nor can I call to mind ever having withdrawn a penny from reserve in my life, always having provided the maximum dividends out of the current year's business.

Next, I am called to task for having recommended a higher standard of illuminating power than 14 candles, as tested by Sugg's No. 1 "London" Argand, this quality being so low that until recently Lord Redesdale refused to sanction it in unopposed Bills. And I am accused of inconsistency on the basis of a report presented to the Leeds Gas Committee, wherein I opposed a proposition to increase the illuminating power of the Leeds gas from 16 to 18 candles.

Well, the quality of the gas here was ordered to be raised from 16 candles, as tested by the new burner, to 16 candles by the old one, an increase of a candle and a half, making the present standard quality in Leeds about three and a half candles, or just 25 per cent. in excess of that fixed by the York Bill.

Now, Mr. Editor, I do not say that the Company are now supplying, or purpose supplying, so poor a quality of gas as indicated by their Act. Then why should they risk their good name by opposing a regulation which only made present conditions obligatory?

There was a most generous disposition manifested towards the Company by the Council, and, as the Company were drawing up articles of agreement which were to be binding upon two parties to a contract over a number of years, it was certainly not unreasonable that the Council should object to these articles being dictated exclusively by the opposite party, on the principle of "Heads I win, tails you lose."

In ordinary business transactions we are not asked to accept the honour of a party as a guarantee for the due fulfilment of a contract, and I cannot help thinking that the York City Council have not acted with business-like care in allowing such an utterly worthless Bill—so far as gas consumers are concerned—as that of the York Gas Company to pass into law unopposed.

Leeds, March 23, 1878. Henry Woodall.

WIGAN CORPORATION GAS ACCOUNTS.

Sir,—Your correspondent who has supplied you with information on this matter has stated that which is not true. The document which you say is a "counterblast to Mr. Templeton's pamphlet" has not "been referred back to the Committee for reconsideration." It has simply been presented to the Committee; but, being too lengthy to be considered sufficiently at one sitting, its further consideration has been adjourned.

With regard to the cutting off of the man's meter, the facts are these:—His account for gas was overdue—not "three," but "eight" weeks from the *delivery* of the account (Jan. 15), which was for gas supplied to the 31st of December last. In accordance with the rules of the department, customers are allowed one calendar month, after delivery of account, for payment, and to those who pay within that time a certain discount is allowed. This person neglected to pay his account, and thereby lost his discount; and after waiting till the 18th of February, and getting no response (and please note that this was *previous* to the pamphlet being issued), we sent him our No. 1 notice, reminding him of his account being outstanding, and requesting payment within *seven* days. No attention was paid to this; and after waiting a further twelve days, and the account still outstanding, a No. 2 notice was sent, demanding payment within *three* days, failing which the supply of gas would be cut off. *Four* days having elapsed from the delivery of the second notice, which, like the first, was treated with contempt, the gas was cut off. I enclose copies of notices sent, and I should like to know what other course, as Manager of these works, I could have taken.

I may add that, in the previous quarter, he had, in a similar way, failed to pay his gas bill, and after the usual notices had been served, only paid the account when men had been despatched to take away the meter. This is the person who charges the Gas Committee and their officials with incompetence in dealing with the gas accounts!

J. G. Hawkins.

Borough Gas-Works, Wigan, March 22, 1878.

ANNUAL ACCOUNTS OF GAS COMPANIES.

Sir,—Referring to your replies to correspondents in the Journal of this week's issue, I find that, in answer to "J. P.," of Weston-super-Mare, you state that the Gas-Works Clauses Act, 1871, which the Court of Queen's Bench have decided is applicable to all Companies whose Special Acts incorporate the General Act of 1847, provides that the annual accounts, filed with the Clerk of the Peace, shall be made up to the 31st of December in each year.

As I am unable to find, in the Gas-works Clauses Acts of 1847 and 1871, any such provision, and as I think it is of importance to many Gas Companies, who are unable, from several causes, to get their accounts completed and audited by the 31st of January, I shall feel obliged by your furnishing me with further information upon the subject.

The Gas-Works Clauses Act, 1847 (10 Vict. cap. 15, sec. 38), provides that the accounts shall be transmitted on or before the 31st of January in each year, but it does not mention that those accounts shall be made up to the 31st of December previously.

The Gas-Works Clauses Act, 1871 (34 & 35 Vict., cap. 41, sec. 31), provides that the undertakers shall fill up and forward to the *Local Authority* (*not the Clerk of the Peace*) of every district within the limits of the special Act, on or before the 25th day of March in each year, an annual statement of accounts made up to the 31st day of December then next preceding, &c.

I cannot find in this Act that the accounts are to be forwarded to the Clerk of the Peace. W. J. Russell, Secretary.

Croydon Commercial Gas and Coke Company, March 21, 1878.

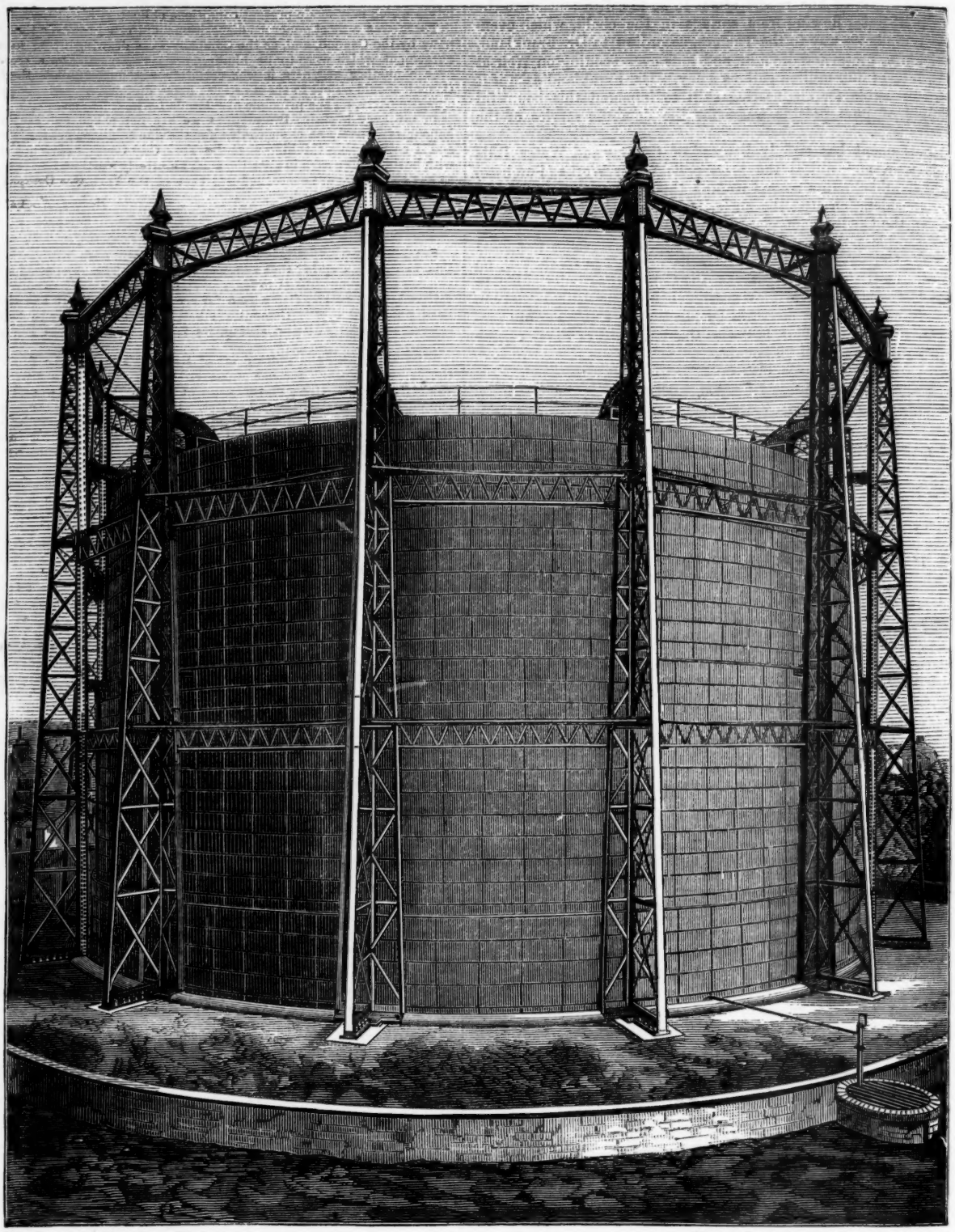
Sir,—I observe your reply to my communication. I shall be much obliged if you will kindly inform me what clause of the Act of 1871, "*provides that the annual accounts filed with the Clerk of the Peace shall be made up to the 31st of December in each year.*" I cannot find it. The Act of 1847, clause 38, expressly states that the accounts to be so filed shall be *in abstract*, and Mr. Michael, in his work on Gas Supply (repeated in the new edition), gives a form of accounts for the purpose. The same clause enacts that such accounts shall be filed before the 31st of January in each year. The penalty in default is £20.

Clause 35 of the Act, 1871, says nothing whatever about accounts to be filed with the Clerk of the Peace; but prescribes forms of accounts to be forwarded to the *Local Authority* by the 25th of March, made up to the previous 31st of December. I do not, however, see a single word that this is in *substitution* of the other provision, neither may it be said to be inconsistent with it. In fact, Mr. Michael treats the matter as quite distinct, and does not offer a word of comment upon the clause.

I shall be glad if you are right in your construction (as we have hitherto continued to prepare special accounts made up to the 30th of June, to comply with the requirement of filing the same in January, seeing that our meeting for passing the December accounts cannot, by our special Act, be held till February; but I confess I cannot see it.

Weston-super-Mare Gas Company, March 20, 1878. J. Panes.

GASHOLDER AT THE BRIGHTON AND HOVE GAS-WORKS.



John Birch Paddon, Esq., Engineer. *Messrs. S. Cutler and Sons, Contractors.*

We illustrate above a large treble-lift gasholder (originally a single one), which has been erected at the Hove works of the Brighton and Hove General Gas Company. This holder was designed by, and carried out under the superintendence of, the Engineer to that Company, Mr. J. B. Paddon, M.I.C.E., the Contractors being Messrs. S. Cutler and Sons, of Millwall, London.

Special construction was necessary, in consequence of the limited area of site, and of exposure to the unimpeded force of the wind direct from the sea. The grips and cups are of unusual strength and depth, and to compensate for the loss of space arising from the extra depth of cups, the middle lift has been made deeper than the inside and outside lifts. This arrangement permits the guide-carriages to be fixed below the curbs, where they are in a position of great safety.

The guide-framing is of wrought iron, and has received great care in the distribution and apportionment of materials according to the strains developed by the conditions under which the holder is worked. With an impact of wind equal to 50 lbs. per square foot, there is no part of the structure which would be exposed to a strain exceeding 5 tons per square inch of effective section.

The outer or bottom lift of the holder is 100 feet in diameter and 24 feet deep; the middle lift is 18 inches smaller, and 25 feet deep; and the top lift is 97 feet in diameter and 24 feet deep.

The holder has been uninterruptedly at work since October, 1876, and has given the greatest satisfaction. In no single instance has there been the slightest difficulty in the working of either of the three lifts. The construction of this work was effected under some adverse circumstances, one being that the Contractors were not permitted to empty the tank.

CORPORATION OF BIRMINGHAM.—GAS DEPARTMENT.

Comparative Statement showing Expenditure and Receipts, with Analysis thereof (Companies and Corporation) per 1000 Feet of Gas sold.

EXPENDITURE.

—	Manufacture.					Distribution.			Lighting, and Repairing Public Lamps.	Rent, Rates, and Taxes.	Directors.	Management.					Law and Parliamentary Charges.	Bad Debts.
	Coal, including Carriage, Unloading, and all Expenses of depositing at Works.	Purifying Materials and Wages.	Salaries of Engineers, Superintendents, and Officers at at Works.	Wages at Works (Carbonizers).	Repairs and Maintenance of Works and Plant.	Salaries of Chief Inspector, Inspectors, Assistant Inspector, and Clerks in Light Office.	Repairs, Maintenance, and Renewal of Mains and Service-pipes, including Materials, Laying, Paving, and Labour.	Repairing, Renewing, and Refixing Meters.				Salaries of Secretary, Accountant, and Clerks.	Salaries of Collectors and Clerks, and Commission.	Stationery and Printing.	General Establishment Charges and Incidentals.	Auditor.		
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
Birmingham Gas Company. Year ending Dec. 31, 1875 (800,404,000 cubic feet).	75,625	818	950	22,339	Includ. in 4.	2888	Included in 6.	1603	505	3,766	600	785	1645	378	894	67	1032	2236
	22·68	·24	·29	6·70	—	·86	—	·48	·15	1·13	·18	·23	·49	·12	·27	·02	·31	·67
	29·91					1·34						1·31						
Staffordshire Gas Company. Year ending Dec. 31, 1875 (1,539,722,000 cubic feet).	153,245	2075	1625	29,616	12,693	Included in 7.	4513	6145	3001	7,815	1200	1420	8926	798	2272	44	—	1579
	23·89	·32	·25	4·61	1·97	—	·71	·96	·47	1·22	·18	·23	1·40	·12	·35	·01	—	·24
	31·04					1·67						2·29						
Companies. Total, 1875 (2,340,126,000 cubic feet).	228,870	2893	2575	64,648	Includ. in 4.	7401	Included in 6.	7748	3506	11,581	1800	2205	10,571	1176	3166	111	1032	3815
	23·47	·30	·27	6·63	—	·76	—	·80	·36	1·18	·18	·23	1·09	·12	·32	·01	·11	·39
	30·67					1·56						1·95						
Corporation. Total, 1876 (2,378,000,000 cubic feet).	211,599	3975	2628	38,928	23,782	7376	18,220	6455	3268	11,882	—	1671	3622	842	3375	68	545	3805
	21·36	·40	·26	3·94	2·41	·74	1·84	·66	·33	1·19	—	·17	·36	·08	·34	—	·05	·38
	28·37					3·24						·95						
Corporation. Total, 1877 (2,380,219,000 cubic feet).	170,126	5139	2279	40,630	32,908	8491	26,132	8137	3764	12,722	—	1834	1333	863	3066	53	4349	3407
	17·15	·52	·23	4·03	3·32	·86	2·64	·89	·37	1·27	—	·18	·13	·09	·31	—	·44	·35
	25·24					4·39						·71						

EXPENDITURE (*continued*). — RECEIPTS.

—	Expenses on Loans.	Bank Charges.	Interest on Temporary Loans.	Interest on M'rtgages and Bonds.	Interest on Debenture Stock.	Annuities.	Dividends.	Depreciation.	Sinking-Fund.	Total Expenditure.	Sale of Gas after Deducting Discounts and Allowances.	Residual Products. Coke & Breeze, less Labour and Cartage.	Tar.	Ammoniacal Liquor	Sundry Residual Products.	Rents.	Fittings.	Discount on Purchases.	Transfer Fees.	Bank Interests.	Rental of Meters	Total Receipts.	Net Profits.
	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.
Birmingham Gas Company. Year ending Dec. 31, 1875 (800,404,000 cubic feet).	789	754	9726	—	—	—	26,635	—	—	154,035	121,013	24,884	11,335	5,102	334	94	104	401	—	—	—	163,267	9,232
	·24	·22	2·92	—	—	—	7·99	—	—	46·19	36·28	7·46	3·40	1·53	·10	·03	·03	·12	—	—	—	48·95	2·76
	11·37																						
Staffordshire Gas Company. Year ending Dec. 31, 1875 (1,539,722,000 cubic feet).	—	87	889	—	—	—	55,871	—	—	293,814	240,223	62,870	17,611	10,513	2471	187	2828	252	—	—	—	336,955	43,141
	—	·01	·13	—	—	—	8·71	—	—	45·78	37·45	9·81	2·75	1·64	·38	·03	·45	·04	—	—	—	52·55	6·77
	8·85																						
Companies. Total, 1875 (2,340,126,000 cubic feet).	789	841	10,615	—	—	—	82,506	—	—	447,849	361,236	87,754	28,946	15,615	2805	281	2932	653	—	—	—	500,222	52,373
	·08	·08	1·08	—	—	—	8·46	—	—	45·92	37·05	9·00	2·96	1·61	·28	·03	·31	·06	—	—	—	51·30	5·38
	8·70																						
Corporation. Total, 1876 (2,378,000,000 cubic feet).	205	76	3426	23,673	1959	56,270	—	4000	3833	435,483	344,144	70,790	31,165	16,271	456	1411	4352	1005	11	—	—	469,605	34,122
	·02	—	·34	2·41	·19	5·69	—	·40	·39	43·95	34·74	7·14	3·15	1·64	·05	·13	·44	·10	—	—	—	47·39	3·44
	8·65																						
Corporation. Total, 1877 (2,380,219,000 cubic feet).	290	59	1468	28,492	1946	55,617	—	—	3938	417·043	342,614	55,868	33,205	16,584	182	1417	2662	1184	11	—	—	453,727	36,684
	·03	—	·15	2·90	·19	5·61	—	—	·39	42·05	34·54	5·63	3·36	1·67	·02	·15	·26	·12	—	—	—	45·75	3·70
	8·85																						

Secretary's Office, Birmingham, March 15, 1878.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MARCH 18.

A petition for additional provision in the Leicester Corporation Bill, together with proposed amendments, clause, and schedule annexed thereto, was presented from the Leicester Corporation, and referred to the Examiners.

Bill reported from the Select Committee, with amendments:—Trowbridge Water.

Bills read the third time, passed, and sent to the Commons:—Batley Corporation Water; Exeter Gas.

TUESDAY, MARCH 19.

The Examiners reported that no further Standing Orders are applicable to the Hartlepool Gas and Water Bill.

Bill reported with amendments:—Clitheroe Gas, Water, and Improvement.

THURSDAY, MARCH 21.

Bills brought from the Commons, read the first time, and referred to the Examiners:—Bangor Local Board; Sevenoaks Water.

FRIDAY, MARCH 22.

A petition for additional provision in the South Staffordshire Water Bill, together with proposed clauses annexed thereto, was presented from South Staffordshire Water-Works Company, and referred to the Examiners.

The Examiners reported that the further Standing Orders applicable to the Brading Harbour District Gas Bill have been complied with; and that the Standing Orders have not been complied with in respect of the petition for additional provision in the Leicester Corporation Bill.

Bill brought from the Commons, read the first time, and referred to the Examiners:—Southport Water.

Bills read the third time, passed, and sent to the Commons:—Clitheroe Gas, Water, and Improvement; Forfar Water.

HOUSE OF COMMONS.

MONDAY, MARCH 18.

Bills, as amended, considered, and ordered for third reading:—Marske and Saltburn Gas; Southport Water.

Lords Bill read a second time, and committed:—Deal Water.

Lords Bill read the first time, and referred to the Examiners:—Bedlington Local Board Water.

The Cheltenham Water Bill was reported, "Preamble not proved."

The Examiners reported that no Standing Orders not previously inquired into are applicable to the Dublin Corporation Water-Works Acts Amendment Bill (Lords).

Petitions against the Manchester Corporation Water Bill, and for dispensing with Standing Order 129 in the case of the said petition, were presented from Hyde Local Board.

A petition in favour of the Nottingham Water Bill was presented from Duke of Portland*; and one against the Bill, for the insertion of a clause (the petitioners not praying to be heard), was presented from Inhabitants and owners of property in Carlton.

The petitions were withdrawn of North-Eastern Railway Company against the Scarborough Water Bill; and of London and North-Western Railway Company against the West Houghton Local Board Bill.

TUESDAY, MARCH 19.

Bills reported:—Durham Water; Shrewsbury Gas; West Houghton Local Board.

Bills read the third time, and passed:—Bangor Local Board; Sevenoaks Water.

Bill read a second time, and committed:—Radcliffe and Pilkington Gas.

Lords Bills read the first time, and referred to the Examiners:—Batley Corporation Water: Sutton-in-Ashfield Gas.

The following resolution reported from the Standing Orders Committee was agreed to:—"That in the case of the Manchester Corporation Water Bill, petition of the Hyde Local Board for dispensing with Standing Order No. 129 in the case of their petition against the Bill, the said Standing Order ought to be dispensed with."

WEDNESDAY, MARCH 20.

Lords Bill read a second time, and committed:—Imperial Continental Gas Association.

Lords Bill read the first time, and referred to the Examiners:—Exeter Gas.

Bill reported:—Bradford Water and Improvement.

Petitions against the Metropolis Water Supply Bill were presented from the Vestry of St. Pancras, and (the petitioners not praying to be heard) Representatives of Vestries and District Boards of the Metropolis.

THURSDAY, MARCH 21.

Bill read the third time, and passed:—Southport Water.

FRIDAY, MARCH 22.

Bills reported:—Cockermouth and Workington Water; East Grinstead Gas and Water; Scarborough Corporation Water; Scarborough Water; South Hants Water.

Bill read the third time, and passed:—Marske and Saltburn Gas.

Bill, as amended, considered, and ordered for third reading:—Farnworth and Kearsley Gas.

HOUSE OF LORDS COMMITTEE.

TUESDAY, MARCH 5.

(*Before the Marquis of* RIPON, *Chairman; Earl* WALDEGRAVE, *Earl* COTTENHAM, *Lord* VENTRY, *and Lord* MONTEAGLE *of* BRANDON.)

EXETER GAS BILL.

Mr. POPE, Q.C., Mr. MICHAEL, and Mr. PITT LEWIS appeared for the the promoters; Mr. GRANVILLE SOMERSET, Q.C., and Mr. BALFOUR-BROWNE for the Corporation of Exeter, petitioners against the Bill.

Mr. POPE, in opening the case for the promoters, said the object of the Bill was to empower the Exeter Gaslight and Coke Company to acquire further land for the extension of their works, and also to raise additional capital, and for other purposes. The existing works of the Company, being very old, were not such as modern requirements looked upon as necessary, and the object of the Bill was to enable the Company to acquire the capital necessary to remodel their works, and place them upon a footing commensurate with the interests of the city of Exeter. The Corporation did not deny that a considerable amount of capital was necessary for that purpose, but they went further, and intimated that they were desirous of a clause enabling them, when they liked, and how they liked, to acquire the property of the Company for themselves, instead of allowing the Company to derive the profit their enterprise deserved. The Company were incorporated in 1816, and for 20 years, the population of Exeter being very small, they continued their operations under that old and antiquated Act, without any further amount of capital being authorized, the original capital being only £12,000. In 1836 their capital was found insufficient, and the Company obtained another Act, which increased the amount to £40,000; but in neither Act were any borrowing powers authorized. In the same year, 1836, a rival Company were established, with a small capital; but, in about three years, the result was an amalgamation between the two Companies. In 1851 another attempt was made to form a Consumers Company, but it was abandoned. In 1852 the balance of the capital power of the old Company was exhausted, and they did what was undoubtedly an illegal thing—they applied a portion of their profits to the extension of their works—so that in 1865, when they applied to Parliament for the Act under which they were at present carrying on their operations, they had expended more than £11,000 over and above their capital of £40,000. But the price of gas had been reduced from 9s. 6d.—which it was originally—to 4s. per 1000 in 1864, and they paid dividends ranging from 10 to 8 per cent., but about an average of 8 per cent. In 1865, Parliament passed the Company's Bill, authorizing the capitalization of £10,000, out of the £11,000 which had been expended, at a certain rate of interest; but they also allowed the raising of additional capital of £20,000, with a dividend of 7 per cent. The works had now, however, become old fashioned, and the Company asked the Committee to sanction their raising a sufficient sum of money to place them in a satisfactory condition. There had latterly been a not unnatural desire on the part of Local Authorities to possess themselves of gas and water undertakings, but, except in one instance, Parliament had never sanctioned the compulsory acquisition of property of that class by Corporations. The result of parliamentary inquiries during the last 12 or 15 years had shown that the interests of the consumers might be as effectually protected by the general legislation upon which Parliament had insisted as by the acquisition of undertakings by Corporations. In the previous session, in order that consumers might be placed in positions of advantage, the House of Commons passed a Standing Order requiring that all new capital should be sold by auction, so that the public would give what the shares were actually worth, and the premiums realized were to go as part of the original capital; so that, supposing the Exeter Gas Company were to find it necessary to raise £100,000, instead of being allowed to raise that amount of dividend-bearing capital, they would only be allowed to issue, say, £80,000 worth of stock, and apply the £20,000—the additional sum which the public would give for the shares—as capital which would not bear dividend, and therefore would not be chargeable against the consumers. But as a compensation for that, it was provided that if, by economy and good management, they could succeed in reducing the price of gas beyond a specified standard, they should receive a certain increase of dividend, whereas, on the other hand, if by bad management or by accidental circumstances, such as the coal famine, the price of gas was increased, then the dividend was to be reduced in like proportion. The Company now proposed to raise £162,000—viz., £130,000 by the creation of shares, which, of course, would be issued subject to the auction clauses, with a dividend limited to 7 per cent., and by borrowing money for the remainder. It would be necessary to expend, within the next six or seven years, at least £110,000 in order to make the works what they ought to be, and that was really the whole of the Bill. The Company did not propose to increase their area of supply, to alter their illuminating power, to supply any worse gas, or anything of that kind, but simply to obtain money for carrying out necessary improvements. One of the grievances of the Corporation was that the works were at present a source of nuisance, and the Company admitted that many of the complaints were true to a certain extent, and it was to obviate those complaints that the Company made their present application. The Company still proposed to charge 4s. per 1000 for their gas, which was the price they had charged hitherto, and which they thought was a moderate price. The Corporation in their petition complained of the capital asked for as being excessive; but that was a common form of allegation, and the petitioners could not have been aware of the fact that, as the new capital must be put up to auction, the old grievances had been swept away, seeing that the Company could not issue those shares at a premium which the Shareholders could put into their pockets. The petitioners also alleged that the price proposed to be charged was excessive, that the pressure was quite inadequate, the illuminating power insufficient, and the testing-place being on the Company's works, useless and fallacious. They likewise objected to the standard of purity, and said the gas ought to be "supplied free from carbonic acid and sulphuretted hydrogen, so that such gas might not, in the process of consumption or otherwise, give off vapours injurious to health." The Company quite agreed with that sentence, and hoped the Committee would grant sufficient capital to secure for the future that there should be no ground for complaint on these points. The Corporation alleged that since 1865 there had been but slight amendments in the conduct of the works, and that so very badly had they been managed that on one occasion within the last twelve months, owing to some carelessness at the works, the whole of the gas in the public lamps went out suddenly. That was perfectly true, but the reason was that the works were not such as they ought to be, and as they would be if the Committee passed the Bill; but certainly not as they would be if the Corporation carried out their views and bought the works, because they gave no undertaking, neither did they say anything about improving the supply, or things of that kind. The petition also complained of the situation of the works, but in a gas manager's view, they were admirably placed. They were in the lowest part of the town, and for the purposes of gas-making and supply presented very considerable conveniences. How far the prevailing wind might be south-west, and waft any smell—if smell there were—might be a matter of opinion; but under such circumstances the smell ought to be reduced to a minimum. Then came the paragraph which was really the gist of the whole matter—"That the Bill contains no provision for requiring the Company, if and when thereunto required, to sell and transfer their undertaking to the Corporation as the Sanitary Authority." In other words, they complained that the gentlemen who were willing to find the money for the undertaking, for the purpose of putting it in order and making it efficient, should be unwilling to leave it in the hands of the Corporation, just when they liked and how they liked, to call upon them to part with their property compulsorily for the benefit of the Corporation. They also went on to say they "submit that, in accordance with the now frequent usage, a clause to this effect should be inserted in the Bill." That was a statement which ought not to have appeared in the petition. The Corporation might have claimed it, or asked it as a matter of argument; but they had no right to attempt to deceive the Committee by saying it was a "frequent usage" to insert such clauses in Gas Bills. They asked that "a clause to this effect should be inserted in the Bill; such sale, if called for, to be made upon terms to be then agreed on between the Company and the Corporation, or, failing such terms, by arbitration." Upon such terms as that, no men in their senses would advance money to put the concern in order, because as soon as that money began to receive the usual interest, somebody else

* This petition is also against the Nottingham Improvement, Gas, and Water Bill.

would step in and take the profit out of their hands. The truth was that, in 1876, negotiations for the purchase of the undertaking were very nearly successful, and if the parties could agree, there was no reason why the transfer should not take place. But, in 1877, the Corporation became alarmed on account of the agitation about the electric light, and they passed a resolution that it was not expedient to proceed further with the negotiations for the purchase of the Gas Company. The Company then being in the position that the Corporation were sanctioning prosecutions against them for nuisance in consequence of the state of the works, it was impossible for them to allow matters to remain as they were, and they therefore applied to the Committee for means to put the thing right; but the Corporation, who refused then to buy, now came and said, "You shall not put it right unless you insert in your Bill a clause that we are to have the whole benefit of what you do, at what terms we like, and when we like, during the course of the undertaking." That was really the whole matter. The case of the Corporation was, to a large extent, the case of the Company. The latter must have the money, and they must do the work. The only question was, how much money? They must have it at such a price as would enable them to raise it. Another question was, what was the standard price which would enable the Company to pay 7 per cent., which was the acknowledged statutory dividend? Having settled those two matters, nothing remained for the Corporation to say, excepting they asked that it should be upon some terms which they were to have the benefit of, and not those whose enterprise found the money. The Corporation could not find a precedent for any such contention, and until they did, it could hardly be supposed they would prevail with the Committee more than any other Corporation.

Mr. *William Cuthbertson*, examined by Mr. MICHAEL.

I was appointed a Director of the Exeter Gas Company in 1867, Deputy-Chairman in 1871, and Chairman in 1872. I was Mayor of Exeter last year, and for the last five years have been a member of the Local Board of St. Thomas, in which parish the gas-works are situated. In 1874 a complaint was made by Mr. Follett, who was then Mayor, of the nuisance occasioned by the gas-works, and I at once said to all the members of the Council, "If you will come and look over the works with us we will do our utmost to correct the matter, and no pains shall be spared by us in doing it." Captain Thompson also complained, and I went round the works with him over and over again, begging him to point out any error he could in the construction or working. I had the impression the smell came from the spent lime, while Captain Thompson said it arose from the chimney; but I said, "That is utterly impossible, for the chimney is only used for furnace purposes." We found, however, that there was continual complaint, and so I suggested to the Directors that they should have an eminent man to examine the works and point out the defects, and we engaged Dr. Letheby, who went over the works very carefully, and finally stated it was utterly impossible for any smell which arose from the works to reach as far as Colleton Crescent. Immediately after we had the report from Dr. Letheby, the Council themselves had down another eminent man—Dr. Redwood—and his account almost entirely agreed with Dr. Letheby's. During the time of my mayoralty, I was very careful that I would not show any disposition to take advantage of my position to promote the work of the Company as Chairman. In consequence of the complaints, Mr. Stevenson was engaged by the Town Council, and he came down and drew up a report, in which he condemned the works as being inadequate for the requirements of the present day, and said there must be an immense addition to the works. We had before that been considering an application to Parliament, but the transactions with the Town Council offering to buy us—and we were willing to sell—kept the matter in abeyance. After Mr. Stevenson's visit, we had Mr. Spice down to look over the works, and he reported that what Mr. Stevenson said was true. We then determined at once to apply to Parliament to correct the errors which were pointed out to us, and we now apply for the necessary money. We do not find fault with the way in which the Council have behaved. There was a petition got up by a certain number of inhabitants in the neighbourhood of Colleton Crescent, which compelled the Town Council to prosecute us. We had no complaints from the district of St. Thomas, although I requested our Inspector of Nuisances to go round and examine for himself, and let me know if there were any complaints. As Chairman of the Gas Company, if any complaints were made of the public lighting they would come to my knowledge, but the complaints were not so much of the state of the lights as of their being out. On one occasion I was called into the city because nearly all the public lights had gone out. Speaking generally, we have not had any complaints from the Town Council as to the mode of fulfilling our parliamentary obligations. Our object here is to obtain such capital as will allow the works to be thoroughly remodelled and put into proper order, to meet the requirements of the town, and to put ourselves under the further restrictions imposed by recent legislation with respect to gas undertakings.

Cross-examined by Mr. SOMERSET: Our present capital is about £70,000, and we propose to take powers to raise £160,000 more, which, in the opinion of Mr. Spice, will enable us to go on for about ten years to come The works are reported to be in a very bad state; but I do not think so. I tried to discover the smells which were stated to be very offensive, but I could not.

Mr. MICHAEL: I may save my learned friend any more trouble about that. We were convicted of making a very bad smell, and if we did so it was very wrong of us. We committed a nuisance, and I hope we shall not do so again.

Cross-examination resumed: There are other members of the Town Council who have tried to discover these smells; but they have not been able to do so. I object to any power of purchase being put into this Bill, and I will give a reason for doing so. The Council and ourselves met on the most friendly terms, and once we almost completed the transfer of the works, and nothing could have been more fair and above-board; but at the last moment, when we were preparing our figures, it was moved in the Town Council by Mr. Follett, that it was inexpedient then to proceed further with the transaction. Of course, there could be hardly any way of dealing under such circumstances, and the matter was stopped. That was in 1877. I should think that if we spent this money we could hardly expect to realize a profit the first year or the second year; and it would be very unfair to compel the Company—speaking for the Shareholders who have advanced their money—to sell the works at the very lowest rate of interest they have returned. We do not propose to reduce the price of gas, because that would be impossible if we are to raise the capital which we shall have to expend for our works. The ratepayers will be in no worse position, because they will have the gas at the same price as now. Before we can get large dividends we shall have to lower the price of the gas. We shall be as anxious to do that as the consumers to receive it.

Re-examined by Mr. MICHAEL: I think an agreement is a very different thing from compulsion; and, speaking for myself, I should be willing to treat with the Corporation by agreement.

Mr. SOMERSET: Does that mean that you are going to put a clause into this Bill to sell by agreement?

Mr. MICHAEL: If you are willing to accept such a clause, I should be willing to insert it. I make the offer, that if you like to withdraw your compulsory demand, I am willing to put in a clause enabling you to acquire the undertaking by agreement.

Mr. SOMERSET: We have many other objections besides that, which I cannot withdraw; but I will refer the matter to my clients.

Mr. *Alfred Lass*, examined by Mr. MICHAEL.

I am a public accountant, and have investigated the accounts of the Exeter Gas Company. At the present time the share capital—stock and shares—is as follows:—10 per cent. stock, £40,000 fully paid up; 4 per cent. stock, £10,000; and £20,000 raised in shares, 5 per cent. preference; altogether, £70,000. They have also raised on loans a sum of £7500, making the share and loan capital £77,500. That is to the end of 1877. The capital expended up to Dec. 31, 1877, amounts to £81,984 13s. 10d., showing an amount overdrawn of £4484 13s. 10d.

Cross-examined by Mr. SOMERSET: I do not think the Company have paid their maximum dividends for some years past. The loans are raised at £4 5s. and £4 7s. 6d. per cent.

Mr. *W. A. Padfield*, examined by Mr. LEWIS.

I have been Secretary to the Exeter Gas Company since 1872. In 1873 complaints were made of nuisances supposed to arise from the works, but the complainants themselves attributed those nuisances to Mr. Hicks's factory. Mr. Hicks at that time was taking the ammoniacal liquor from the Company, at a fixed price of 100 guineas a year; but in consequence of those complaints the Company arranged with him to remove his works, giving him an extended term of six years, at an increased rental of only £50 a year, as an inducement to go away. By that step the Company incurred a loss of £1500 a year. In 1874 the Mayor and Town Clerk visited various works, and made suggestions as to our conduct of the works, which were carried out to a very great extent. The principal suggestion was the use of oxide of iron for purifying, and that we have continued to use ever since. There has been a long correspondence between the Company and the Town Council, in which we asked the Council to point out any defect, and promised to remedy the same if it was shown to us. The Company gave Dr. Redwood every facility to examine the works, and his report, so far as it was founded upon the principal observation, was in favour of our works.

Cross-examined by Mr. SOMERSET: We are now paying 10 per cent., but it has only been for a short time. From 1866 to 1869 it was 8 per cent.; in 1870, 9 per cent.; in 1871, 10 per cent.; but we had a very favourable contract during that year; in 1872, 10 per cent.; in 1873, 9 per cent.; in 1874, 8 per cent.; in 1875, 8 per cent.; in 1876, 10 per cent.; and in 1877, 10 per cent. We lost £1500 a year through getting rid of Mr. Hicks, because we could have made the liquor into sulphate of ammonia at that profit.

Mr. SOMERSET: Did you make a profit of £1500 a year out of the liquor the year before he went, or any year previously?

Witness: We did not; we never made it. The highest price we ever made out of the liquor was £105 a year.

If you had made £1500 a year, that would really have come from the ratepayers, for you were paying your highest dividend, and you would have had to reduce your price?—That does not follow.

But it is the law, as you know. If you had made £1500—or whatever it was—it came from the ratepayers, and you would have had to have reduced your price?—It might have done so.

Re-examined by Mr. MICHAEL: Since the time we made the contract with Mr. Hicks ammoniacal liquor has very much increased in value, and therefore we should have had an opportunity of making a new contract at increased terms.

Mr. MICHAEL: With respect to the money, even if you were paying your maximum dividend then, and you got the £1500, that would have inured to the benefit of the Shareholders, if you had not paid the total amount of your back dividends?

Witness: Yes.

You have said that for several years you received only 9 and 8 per cent.; therefore all that money had to be recouped to the Company under the operation of the Gas-Works Clauses Act, 1847?—Yes. We had power to do so, but we have not done so up to the present time.

WEDNESDAY, MARCH 6.

Mr. *Robert Paulson Spice*, examined by Mr. MICHAEL.

I have been to Exeter three times to investigate the Company's works and business, the first time being in April of last year. I made a report in reply to one from Mr. Stevenson. I found the gas-works to be in an old-fashioned condition, but the Company were making alterations and improvements when I was there. My estimate of what is necessary to put the works right is £110,800—not in structures entirely, for they have exhausted their powers and entrenched upon different funds, and have had recourse to temporary borrowing; but to place those matters right as well as to build new works would cost £110,800. In that amount I have calculated the introduction of modern improvements, and meeting the requirements of the next ten years. I think that in twelve years all the share capital now asked for may be expected to be expended, and the Company must come to Parliament again. The Shareholders in an existing undertaking have no interest whatever in the expenditure of capital when auction clauses are introduced into the Act regulating their proceedings.

Mr. MICHAEL: In your experience, at about what rate per cent. would such capital be issued to the public?

Witness: That depends very much upon the credit the concern enjoys—what good repute it has. If it is in good repute, the public will form a favourable estimate of its chance of paying maximum dividends, and in that case 7 per cent. stock will command a premium, in the market generally, of about 40 per cent.

That is to say, capital which is entitled to a maximum dividend of 7 per cent. will really be issued only to cost the consumers 5 per cent.?—Yes; always assuming that the public in the district have a good opinion of it as to its power for earning the maximum dividend provided.

The 40 per cent. goes into the capital, and receives no dividend?—Yes; that enables the Company to sell gas at a lower price than they otherwise could do, and it gives security to the original Shareholders. An importation of non-dividend bearing capital must tend to increase the security of that which bears dividend.

Under these circumstances, then, has the Legislature, in your opinion, adopted a useful rule in making all this money to be issued by sale by auction, in order to prevent any unnecessary expenditure of capital?—Yes; there is no longer any inducement that Directors shall expend capital in anticipation of wanting it.

And it matters very little, comparatively, what the rate of dividend is?—Yes. If I were the Legislature, I should as soon sanction a Gas Company having 10 per cent. as 7 per cent., because the 10 per cent. will command a greater amount of money being paid as premium.

We now come to the question of standard price. Of course the maximum price goes out of consideration, and a standard is fixed which, under contingencies, would fairly meet the requirements, so that the Company may not lose if coal and labour rise, and if things continue at the cheapest they will not get too large a profit?—They cannot get too large a profit, because the sliding scale forms part of the Bill. They

ought to have the chance of increasing their dividends by means of increased economy.

But they cannot increase their dividend without giving a corresponding advantage to every consumer?—No; they take the consumers, as it were, into partnership.

What do you think is a fair standard price, looking to all the circumstances of the case?—I think the present price, which is 4s.

Of course this large amount of capital to be expended—which you say is necessary—will throw a greater burden upon the present Shareholders, and they must wait some time before they can expect to realize the full advantage of it?—Yes.

That will be capital, in fact, placed as a dead weight upon the Company, and tend to reduce the dividend actually increasing to their profit?—The Company can only pay maximum dividends by an increased amount of economy. The new works will enable them to manufacture gas at a less cost, and it is only by that economy that they can hope to pay the dividends they have paid on the old capital, and 7 per cent. on the new. The profits earned in the year ending June, 1877, amounted to 12·91d. per 1000 feet, and that is just about 1d. per 1000 feet more than is required to pay the dividend, which is a very small margin indeed. If they are going to spend, as they will do in the next three years, some £50,000 or £60,000, the dividend on that additional capital can only come from increased economy.

If any nuisance has arisen in times past, will what you propose to be done effectually prevent the recurrence of such nuisances in future?—What I propose to do would have the effect of converting the Exeter Gas-Works from an old-fashioned state, liable to all sorts of complaints, into a perfectly modern one, which the inhabitants of Exeter may, and no doubt will, be proud of. There will be no nuisance, and no cause of complaint, but the greatest amount of economy.

Cross-examined by Mr. SOMERSET: The Bill will benefit the ratepayers of Exeter, because, if they cannot get what they want from the old works, they will be only too thankful to get it from the new.

Mr. SOMERSET: I do not see how that benefits them, except that if they cannot get a thing now they may get it afterwards. Does it not enter into that consideration of a benefit whether they pay too much for it?

Witness: They will not pay too much for it.

They propose to raise £162,000 new capital?—£130,000 additional capital, and power to borrow the remainder.

They have spent in the last 60 years £70,000, in round figures?—Yes; and they would have been better off if they had spent £70,000 more.

[Witness handed in an "approximate estimate of expenditure of capital to meet the wants of the next seven years," amounting in the gross to £110,820, in which was included an item of £13,000 for working capital, required to enable the Company to go to market properly.]

Mr. SOMERSET: £110,000 in seven years will leave £60,000; how long do you think that will last?

Witness: About five years, according to my estimate. New works are always receiving new demands; and as the rate of increase is about 10 per cent., at the end of seven years we may expect 50 per cent. further to be added to the demands made upon the Company, and those demands must be provided for by enlarging the new works now to be built. What we have to contend with now is the absolute necessity for annihilating the works, which have grown up in what may be described as a "higgledy-piggledy" manner. I have never previously stated that the works were in a fair state, although I have never said anything hard against them.

Cross-examination continued: I made my estimate, for the purpose of this inquiry, within the last month; but I said a year ago that certain things were wanting. I made a report on the state of the works in March, 1877, but I have not referred to it since. The Directors asked me to examine the works, in consequence of complaints of a nuisance in January of that year; but nobody knows what that nuisance was.

Mr. SOMERSET: Do you know that the Magistrates found out a nuisance several times, and fined the Company?

Witness: I was not there the second time, and they did not pay much regard to me the first time.

When you were down there, did you smell anything very disagreeable?—No; nothing at all.

I will read one line of your report—"You are a credit, a comfort, and a blessing to your good old city." That was your view on March 19, 1877?—That is my view still.

And yet the whole thing is so bad that you must spend £110,000 on it at once?—These men took to gas-making in 1816; they were some of the pioneers of gas lighting, and what Exeter would have done without them I fail to discover. I advised the Company to apply to Parliament, and here they are. They could not make these works other than they were without the authority of Parliament. They have grown up piece by piece, without order or design, so far as the planting of the separate pieces is concerned.

Mr. SOMERSET read some further extracts from Mr. Spice's report, and was about to cross-examine the witness upon them, when he was interrupted by

The CHAIRMAN, who said: Do you want to show that the witness has spoken very well of these works, because, if that is your object, have you not shown it sufficiently?

Mr. SOMERSET: I will not say a word more upon that point. (To witness:) You object to the Corporation taking power to purchase?

Witness: I object to their taking compulsory powers.

Mr. SOMERSET said his learned friend, Mr. Pope, yesterday told their lordships that the Corporation were deceiving the Committee by inserting a paragraph in their petition complaining that the Bill contained no provision for the transfer of the undertaking to the Corporation upon terms to be agreed.

Witness said he would rather leave Mr. Pope to explain his own remarks, and that he did not accuse the Corporation of deception.

Cross-examination continued: I should say it is not a frequent usage for clauses of that description to be inserted; it is never done except it is forced upon Companies. This has been a prosperous concern, and the Corporation—like many other Corporations—desire to become possessed of it. I have had a working statement made out for the twelve months ending June 30, 1877. The amount of gas sold was 115,226,000 feet, and gas made 144,751,500 feet.

Mr. SOMERSET: With regard to the price of gas, you say it is perfectly immaterial whether they are allowed to raise £100,000 capital more or less; under the auction clauses it does not signify?

Witness: As to the quantity of capital they may be authorized to raise, it just depends how long any given amount of capital can carry a concern on. I conceive it would be unreasonable for Gas Companies to have the power to raise capital once for all, but that they should be limited to a reasonable amount to carry them on for 10, 12, or 15 years, because in that time improvements may be effected which will allow Gas Companies to sell gas at a lower price.

Now let us go to the standard price of 4s.; Plymouth is what?—Plymouth has been built up out of profits, and is not a parallel case at all. In that case £60,000 has been spent out of profits. They bought the concern for £15,000 less than it cost, to begin with, and they supply the Government with a very large quantity of gas, the meter being put on just where the gas is delivered into the mains, and there is not any leakage; there are also four or five consumers who consume about a million feet each, but there is nothing like that at Exeter. London is vastly better situated than Exeter, but there is only a difference of 3d. between the standard price of the great Chartered Company and Exeter. The price of gas at Exeter—4s.—will compare favourably with places of the same size. The cost of gas at Exeter in the year ending June 30, 1877, was 34·17d., and the price realized—selling it at 4s. to private consumers, 3s. 9d. to the railway companies, and 3s. to the city (for which they get no thanks)—was 47·08d. The difference between the two, which is the profit, is 12·91d.; that is all the Company have to pay their dividends out of, which requires, in round numbers, 1s. on the small amount of capital at present existing. The Company must effect economies of 6½d. per 1000 feet to enable them to pay the maximum dividend. The unaccounted-for gas amounts to 19·40 per cent. I have never known it to be 40 per cent., although it might have been so, because that has happened many times and in many places. I know that the Company have been laying a large main, and that they have been reducing the leakage for several years. I would not advise the Company to accept a Bill on a less price than 4s., because I believe the effect would be disastrous; they would not be able to raise the money, because the public would not buy the shares, and then the city would suffer. If these works are not put in hand at once, I say Exeter will be in distress for gas. The clause stating that the Company can raise their dividend 5s. for every penny reduction may come into effect in about seven years. I could not say that the rate of increase last year will be maintained year by year. The rate of increase hitherto has been only 5 per cent., but last year it was 9 per cent. If the concern is well managed, and the works are well designed, 9 per cent. may be maintained. I would not refuse the Bill if the sliding scale was refused, but I should consider that it was a refusal of common justice. Where auction clauses are imposed upon a Company, they should have some future chance of benefit, seeing they have all the risk. This Company have the risk of having to find £100,000 in a very short time, and there is an obligation resting upon them to provide for the wants of the place, and those risks should be considered, and some little allowance made in the way of a chance of something beyond 7 per cent. I believe the consumers would stand a better chance if, instead of 7 per cent., the modern rate was 10 per cent., like the old, because the 10 per cent. stock will, as a rule, command a premium of 100 per cent., instead of 40 per cent. for the 7 per cent. The lands proposed to be taken by the Company are some odd pieces belonging to the Corporation. [Witness pointed out the same on the map.] I suggested having a viaduct instead of a tramway, because it would be a means of getting coal direct from the ships without carting.

Re-examined by Mr. MICHAEL: I do not know of any capital which has been raised in London under the sliding scale at a less rate than 10 per cent., but whether it is 10 per cent. or 7 per cent. makes no difference to the consumers, seeing that it would be sold at £200 if it were 10 per cent., or £140 if it were 7 per cent., and, therefore, it would be money put into the capital of the Company in the shape of premiums, receiving no dividend whatever. In my report I stated, "Your first care should be to do what is necessary to set your house in good order, that you may give no cause of offence in any quarter," and I adhere to that statement now. It is absolutely necessary that this money should be expended for the benefit of the gas consumers; but it will throw an additional obligation upon the Company, because the dividends can only come out of increased economy and increased consumption. There are some small asphalte works on the land we propose to take, but very little more than a tar-boiler and a steam-boiler. There must be a sulphurous smell from tar-works, but, as it is, the two smells get mixed up, and we get the credit of both.

Mr. *Alfred Penny*, examined by Mr. MICHAEL.

I have visited the Exeter Gas-Works, and agree with Mr. Spice that they are antiquated, and require to be reconstructed. I do not think any extravagant expenditure of capital has been contemplated; but that, having regard to the natural increase that may be expected in a town like Exeter, a proper provision has been made for such a period as may elapse before they apply to Parliament again. I think the capital asked for, and the rate of dividend and expenditure in the mode proposed, will be only for the advantage of the gas consumers, because the present shareholders can receive no benefit from the emission of this new capital. In the old times, when the shares were issued *pro ratâ* to the existing shareholders, they naturally obtained the benefit of any premiums that the shares might command; but now the outside public come in and buy them if they think they are worth buying, and, as a rule, well-managed gas properties will produce a return which is considered fair if it gives 5 per cent. to the purchaser; and, therefore, any premium beyond that will naturally go as capital which receives no dividend, and will be, of course, to the advantages of the consumer. The tendency of the new works will be to produce gas at a cheaper rate, and to decrease the waste in every part of the manufacture. I do not think so much capital has been expended in the past as ought to have been expended in ordinarily economically conducted gas-works. When I was at the works, there were some smells which are incidental to gas-works, more or less; but I think the smells I experienced emanated just as much from the tar-works as from the gas-works. I think the price of 4s. is a fair and reasonable one to adopt. In many Bills—and in a case in which I was concerned last session—it was considered a proper thing to allow some little margin beyond the actual cost of the gas at the time. In my view, the cost of everything, except labour, is at its minimum just now. Coal, iron, and fire goods are all at the lowest price they are likely to be, and I believe the next change will be an upward one, and if so, the cost of producing gas will be greater. If the Company then raise their price, they must reduce their dividend, so that they will have the strongest inducement not to do so, because they sacrifice their own interest—that is, by the operation of the sliding scale. The price of coal in London is about 3s. or 4s. cheaper than it is in Exeter; I found in Exeter it was between 17s. and 18s., and in London it was from 13s. to 14s. Of course, the residuals find a larger market in London; and it is from the increased price that this Company may hope to get for their residuals that they would be able to pay a dividend on the increased capital they are now asking for. There would also be economy in manufacture by having special appliances, and a diminution of the loss from unaccounted-for gas. I do not know of any case in which Parliament has inserted a clause for the compulsory purchase of a gas undertaking by a corporation. I have been engaged in many cases in which works have been bought by arbitration; but it has never been done by compulsory purchase.

Cross-examined by Mr. BALFOUR BROWNE: I admit that the amount spent last year on repairs and maintenance of works was larger than is ordinarily spent for such a purpose. It was between 9d. and 10d. per 1000 feet made, whereas it should be under 6d. I account for that because they really allowed the works to get into such a state of disrepair that they found it necessary to expend more money in that particular year. I do not know what was spent during the previous year, but I assume that as a natural consequence.

Mr. BROWNE: If your assumption is wrong, should I be right in asserting

that they have been spending as revenue what should properly be ascribed to capital?

Witness: Yes; it is quite possible they may have done so.

Tell me upon what basis you have come to the conclusion that 4s. would be a proper sum to put as the standard price for gas?—Because, with the exception of that one single item, I find nothing else that I can put my finger upon that is not a charge to revenue.

You have taken the accounts as the basis of your calculation, and you have made no deduction for that one single item?—No; and I have made no addition for those consequences which might arise from an increase in the price of coal, iron, and labour.

Supposing that single item is wrong to the amount of 4d., as you make it, that would probably lead to a deduction of 4d. in the standard price?—No; under the circumstances which I have mentioned, I should make no deduction whatever, because I have to look at this as a thing not in perpetuity, but, at all events, for the next ten years; and if coal, iron, and other things rise and produce a cost of 4d. or 6d. per 1000 in addition, I then have something which will enable me to maintain my dividend.

If, on the other hand, you are wrong in supposing that these things are at the present time at the minimum, something ought to be struck off on account of that?—Yes, if I am wrong; but I am not wrong.

Cross-examination continued: I do not think it is of the least possible consequence whether the new capital be £100,000, £200,000, or £300,000, or whether they had power to raise it all at once, or a portion be deferred. I think that, if the inhabitants of Exeter knew that what capital was going to be spent would be spent with a view to economy, they would believe that the dividend would be secure, and they would give a premium such as is now given when shares are sold. I do not think the works as they are now could be carried on without a nuisance. I do not know how long they have been in their present condition, but I should judge they had been in an unsatisfactory state for a considerable period, and the Company ought to have applied to Parliament three years ago at the least.

Mr. Browne: Would you object to accept 4s. as the maximum price, striking out the sliding scale, instead of 4s. as the standard price with the sliding scale?

Witness: I should not object, if the auction clauses were withdrawn, because the capital would then be allotted *pro ratâ* to the existing Shareholders, and they would get the benefit of the premiums, whatever they might be. I am aware that in the Christchurch Act last year the auction clauses were left in, the sliding scale struck out, and a maximum price inserted of 7s.; but that was a very small affair.

Are you aware that in this Company's case the auction clauses have existed since 1865?—I am not aware of it; neither do I think it is so. I do not find it in their Act.

You spoke of the price of coal at Exeter, as compared with the price in London—are you aware that the cost of coal delivered at the works in Exeter is 12s., and would not that alter your judgment as to the proper standard price?—Yes; if you could tell me that 12s. is the price of the proper coal necessary to be used to produce gas of the illuminating power named in the Bill.

Take 9000 cubic feet per ton, at 14 candles?—I should require a larger quantity of gas than that to be made per ton of coal.

Mr. Browne referred to clause 30 of the Exeter Gas Act of 1865, providing that one-half of the capital raised under that Act was to be sold by auction.

Mr. Michael: And they put the premium to the credit of the consumers instead of putting it into their own pockets.

Re-examined by Mr. Michael: If a Company only had sufficient dividend to pay on £50,000, and they issued £50,000 more, there would be necessarily a reduction on the dividend that the old shares would receive; but I do not believe that any Gas Company would be so foolish as to do so. My experience tells me that the amount put down in a Company's accounts for repairs and maintenance is a very uncertain sum. In one year they may do a great deal, and in the next year nothing; the sum of £1300 was expended last year for retorts; but, as a retort lasts about two years, they would not have to make a similar expenditure in the following year. The whole cost of retorts should come into revenue. I am aware that the company have not paid maximum dividends.

Mr. Michael: Therefore, if they have expended their revenue on purposes to which capital ought properly to be applied, have they not been taking profits out of their own pockets?

Witness: I think the fact of a larger expenditure having been made for those purposes, and paid for out of revenue, shows that they do not desire to mulct the concern to too large an extent. The necessary consequence of their operations has been to rob themselves of 2 per cent., to put the money into the works.

Mr. *George Livesey*, examined by Mr. Pope.

I advocated the sliding scale very strongly before Mr. Forster's Committee in the House of Commons. I have inspected the works of the Company, and agree with Mr. Penny and Mr. Spice that they may be considered as antiquated, and requiring considerable expenditure. I have no doubt whatever that immediately on the Company improving their works and mains there will be a very large increase in the demand for gas. It is perfectly certain that with inefficient works they cannot be conducted properly, and that if nuisance is to be avoided the works must be maintained in an efficient state. With an increased capital of £160,000 I should think the Company could not be expected to come to Parliament again within less than 15 years, but that would depend entirely upon the rate of increase in the consumption of gas. Assuming that with increased appliances the consumption increased at the ordinary rate, the works would be doubled and half doubled again in the 15 years. The sliding scale and the auction clauses combined make it to the interest of the Directors to expend their capital as carefully as possible. I consider 4s. to be a fair standard price. The South Metropolitan Company, I think, were treated hardly in being fixed at 3s. 6d., while all the other Companies got 3s. 9d. The price of coal would account for the difference between 4s. in Exeter and 3s. 9d. in London. Assuming the money is judiciously spent, the Shareholders must look for dividend in improved working, diminished leakage, and improved sale of residuals. A large gasholder is imperatively necessary this year; in fact, it is a matter of astonishment to me how the Engineer carried on the business last winter without putting the lights out. I noticed the asphalte-works as we drove up to the gas-works, and I thought, if they were going on, I was not at all surprised at the complaints made. I can state from my own experience that asphalte boiling is an intolerably greater nuisance than anything proceeding from gas-works. The absorption of these premises into the gas-works would therefore be an advantage. I do not want it to be thought that in my own works we ever made asphalte; but in the neighbourhood asphalte was made, and we got the credit of it. The Exeter Gas Company have not hitherto supplied the city properly, and it is absolutely necessary that they should have the power they now ask for to enable them to do it. I do not know of any instance in which Parliament has compulsorily intervened to hand over the property of Gas Companies to Corporations.

Cross-examined by Mr. Somerset: The South Metropolitan Company were never proceeded against for nuisance. I admit there was a nuisance at Exeter, no doubt from inefficient apparatus. The sliding scale was imposed upon the South Metropolitan Company in 1876, previous to which our price was 3s., although we had power to charge 3s. 6d. Our price now is 3s. 2d., and our dividend 11 per cent.

Mr. Somerset: An immense advantage to the consumers, that!

Witness: It will be.

They pay 2d. more, and you get one per cent. more, and you say that is an advantage to the consumers?—The Committee were told that if they gave us the same price as the Chartered Company we would maintain the 3s. price for gas, but they would not listen to any proposals, and we thought they treated us very unfairly; therefore we took the advantage the sliding scale gave us, and raised the price to 3s. 2d. The cases of the Exeter and the South Metropolitan Companies do not run together at all. The South Metropolitan had served the consumers of London better than any other Company, and they were treated worse.

Re-examined by Mr. Pope: In our case, we were actually charging less than the standard price given us by Parliament, while in the present case the standard price asked for is the exact price charged, so that we could not ask for any more than the consumers are at present paying. The South Metropolitan Company starved their works during the bad years, and they maintained the price at 3s. all through the coal famine, when other Companies went up to 5s., and they spent as little as possible on the repairs of the works.

Mr. *Penny* was recalled, and examined as to the proposed alterations of the works, and the advisability of having a tramway or a viaduct for the purpose of delivering the coal into the works, the witness strongly favouring the latter view on the ground of economy and convenience.

Mr. *George Henderson*, examined by Mr. Pope.

I am Secretary and Manager of the Plymouth and Stonehouse Gas Company. Our Company have been quoted as being able to supply gas at a very low price, but that arises from the special circumstances of the Company, and has no reference to the power of a Company like the Exeter Gas Company to supply gas at less than 4s. At Plymouth we have a very small capital, and very exceptional consumers.

Cross-examined by Mr. Somerset: The price at Plymouth is 2s. 4d., and the price of coal 18s., delivered in store.

Re-examined by Mr. Pope: I should think the freight to Exeter is 1s. more than to Plymouth, on the average.

Mr. Pope said that was the case for the promoters of the Bill.

Mr. Granville Somerset, on behalf of the Corporation of Exeter, said the Committee knew perfectly well that the view taken by the Corporation was that the standard price asked for was too high, that they did not believe the auction clauses would have that admirable effect with regard to the consumers which the promoters stated would be the case, and that the amount of capital proposed was perfectly unnecessary. They also believed that the effect would be a very prejudicial one to the consumers, and that it would practically be the means of keeping the Company independent of Parliament, not for 10 or 12 years, as stated by Mr. Spice, but certainly for 30 or 40 years at least. His learned friend admitted that the concern had been open to very serious objections; that from carelessness or ignorance—not mischance—they had committed endless nuisances, and had been repeatedly fined; in fact, their case was, "We have not done what we ought to have done; we have not come to Parliament as we ought to have done; therefore will you grant us £160,000, because, if you do not, Exeter will never be properly supplied with gas." The answer to that was that the Company were not the people to ask for such a thing. If ever there was a case in which compulsory powers of purchase should be granted, it was the present. Who were the parties who objected to the Company being trusted further? The Corporation of Exeter, who were supported by the whole town, and who asked the Committee to prevent those large additional sums being given to a Company who had misused their powers. It was their own confession, or, more than their confession—it was their claim for their Bill that they had so misbehaved. They asked for £160,000, but they had only spent £70,000 during the last 60 years, and they had divided 10 per cent., except on two occasions, within the last ten years. The curious thing was that the famine year was one of the years when they divided 10 per cent.; and it was also put as a very great credit to them that, instead of raising money at 7 per cent., they had raised it at 5 per cent. preference; but a different class of investors put their money into shares of that kind from those who invested in ordinary shares. The question then arose, was it or was it not for the public advantage of Exeter that the Company should go on with their works, or should they be handed over to the Corporation. If the Committee refused the Bill, the result would be that the parties would come to terms, and the Company would obtain a proper price. If, on the other hand, their lordships thought it for the public advantage that the gas supply of Exeter should be retained by these gentlemen for 40 or 50 years, was it necessary to raise £110,000 first of all, and £60,000 afterwards? Mr. Spice said they must make it a new concern—a new building altogether—everything was bad, and must be renewed at once; and yet he spread the expenditure over seven years. Mr. Spice stated that from the £110,000 must be deducted a considerable sum for works already executed (the capital for which had been temporarily advanced), amount owing to reserve-fund and expended on capital account, working capital, &c., making something like £32,000, which left about £82,000; but he (Mr. Somerset) submitted those were not items for which the Company ought to have fresh capital allowed to them. What was to be done with the other £62,000? Mr. Spice said it would be wanted during the succeeding five years. Why, everything was to be made perfect by the end of seven years by his own time and his own figures, and then it required £12,000 a year to be spent for the next five years. Mr. Spice was asked if he could give any reason, but he said he could not; and surely it was not to be expected that the Committee were to be asked to pass a Bill imposing a payment upon the gas consumers of Exeter of £160,000, and yet for that gentleman to say he had no reasons to give. It was said that it was perfectly immaterial whether £100,000 or £1,000,000 were raised, because they had the auction clauses; but was that so? There was great safety in that argument, because there had been no experience of them. What were these auction clauses? First of all, auction clauses or no auction clauses, £130,000 of new capital had to be raised at 7 per cent., and £32,000 at, say, 5 per cent. That came upon the gas consumers of Exeter as £9100 per annum on the ordinary shares, and something like £1500 upon the preference shares, and till that was paid there could be no reduction of price. If they obtained the premiums and so forth there would be a much larger sum than £160,000 to lay out; it might be £200,000, because the premiums were to be applied in improving the works and so forth before the Company need apply to Parliament again. The section in the Bill providing that no single lot should comprise more than £100 nominal value of shares or stock, read very well, but many ingenious schemes might be devised whereby large shareholders with £40,000 or £50,000 in their pockets, might get most of the shares at their own price, or, at any rate, at very nearly par, and not at a premium. With regard to the standard price, the Committee knew how constantly it was insisted upon that when a Company had reached their maximum dividend, they were bound under the general Act to reduce their price; but that was one of the things the standard

price did away with. What chance was there of the gas being reduced in price unless the Company saw their way to make an additional profit of 2, 3, or 4 per cent.? Mr. Spice said that 4s. should be the standard price, and he should not advise the Company to take less. Advice to the Company was one thing, but advice to the Committee was another. He (Mr. Somerset) submitted to their lordships that a reason ought to have been given. He tried to get that reason, and Mr. Spice said there would be a shilling left for dividend, but no other reason could be obtained. Taking Plymouth as an example, with a price of 2s. 4d., and supposing gas to be supplied to Exeter at 2s. 6d., or 2d. more, they ought to pay their 7 and their 10 per cent. dividends if the Committee gave them a standard price of 3s., and have a good 6d. to spare. But if they were allowed 4s., it would be just 1s. 6d. more than they ought, according to the practice of Parliament, to charge. The Committee knew that if the Company reduced the price of gas 4d. they might pay 1 per cent. more dividend. For 1s. reduction, they might be able to pay themselves 3 per cent. more, and therefore supposing the Bill passed, and those calculations were correct, the Company would be in the happy position of paying to themselves upon the ordinary shares at present existing of £40,000, 18 per cent., and upon the shares which they sought under the present Bill—that was £130,000—10 per cent. out of the pockets of the consumers. Supposing those calculations were wrong, and they had 6d. instead of 1s., still that would be a very happy position of things, because then they would pay 11½ and 8½ per cent. Although there was no strictly analogous case, surely there must be in Mr. Spice's experience some town in England like Exeter—something that he might have given to the Committee as a guide—but he said he could not find a parallel case anywhere. There certainly must be a ground of complaint if a gentleman came with such a case as that without being prepared to give reasons. There was another point to which the Corporation had a very serious objection, and that was with regard to the viaduct; but if their lordships would only reject the Bill, that question need not be entered into. In conclusion, he (Mr. Somerset) said that people who, by their own showing, admitted that they had not done anything which they ought to have done, and had done what they ought not to have done, should not be entrusted with further powers, and he would therefore leave the case in their lordships hands.

Mr. *George Hirtzell*, examined by Mr. BALFOUR-BROWNE.

I am a solicitor, and have practised in Exeter for the last 20 years. I am a member of the Town Council, and was engaged in 1865 in promoting a Bill in Parliament for the incorporation of the Exeter Gas Consumers Company. The occasion of the promotion of that Bill was the same as now—viz., the impurity of the gas, the want of quantity, and the way in which the Company dealt with the city. The capital of that Company was £30,000—6000 shares of £5 each, and about half was subscribed. About 9000 ratepayers signed a petition in favour of the Bill, and we had promises of consumers paying to the old Company about £500 a year. I thought at that time there was room for two Companies in Exeter, and that opinion was borne out by evidence presented to the House. A compromise was, however, arrived at, the old Company agreeing to adopt our scale of charge, and to be under certain restrictions; clauses were also agreed upon for testing the gas, and so on, and the illuminating power was increased. The Company had in addition to pay our costs. A clause was likewise inserted that the gas should be tested at the Company's works, but we do not think that has practically been of any value to the consumers in Exeter. We think that the testing ought to be at some part of the town where the gas is actually consumed. There was a Company started in 1851, but I believe it did not go very far. I am told there was another in 1836, but I think the old Company subsequently bought both up. There have been great complaints since 1865, principally of want of pressure; and on various occasions complaints have been made that ordinary atmospheric air has been driven through the pipes with the gas. I believe sulphuretted hydrogen was once to a large extent supplied. There have frequently been offensive smells issuing from the works, and the houses in Colleton Crescent have very much decreased in value in consequence. The smells are like very bad rotten eggs. I once had an idea of purchasing a house in the vicinity of the works, but the smell was so bad I would not have anything to do with it. As a member of the Town Council, I object to the great increase of capital the Company seek to authorize under this Bill. I believe that the Council would be willing to treat with the Company upon fair terms for their present works, but I think that the authorization of this large amount of capital will throw difficulties in the way of any such agreement. In my opinion, the amount sought for is unnecessary for the work to be done, but I am not an engineer. I think if the Company manufacture residual products and tar on the works we shall always have the smells, because the prevailing winds blow in that direction.

Cross-examined by Mr. PITT LEWIS: I have been informed—although I do not know—that atmospheric air produces a great blueness in the flame, and we have constantly observed that. I cannot say whether the Gas Inspector has ever reported the gas; but I know we complain in our own houses. I think the Gas Inspector tests once a fortnight. I think the smells ought to be remedied, and this the Engineer says must be by an entire remodelling of the works. No doubt this would be an expensive process, and that has been so reported to the Town Council. I have heard what Mr. Livesey said about the asphalte-works, but I never knew until to-day that they caused a nuisance. My chief objection to the capital asked for is, that I have not the slightest doubt that, at some future time, the Council will have to buy the works. If the Engineer on our side says it is too much, we shall have to pay so much, if we buy them upon this capital.

Mr. LEWIS: Are you aware, if you had to buy, you would not buy on the capital, but on the basis of the dividend?

Witness: Pardon me; I think you are mistaken. We have just bought the water-works.

Assuming that the basis on which the Town Council would have to purchase is the dividend earned, your objection would then be removed?—I say that, if they expend so large a sum as you ask for, and they are authorized to pay on it a dividend of 7 per cent., they will, when we come to buy, ask that we shall pay them so many years purchase on the 7 per cent. dividend. I am assuming that you will spend the money and pay the dividend on it.

If we spend the money and pay the dividend on it, the expenditure will be necessary, will it not?—There are many ways of dealing with capital besides laying it out on the works.

Re-examined by Mr. SOMERSET: If we bought now we should have to buy upon a dividend of, say, £5000 a year; but if this Bill passes, we should have to buy upon a dividend of about £16,000 a year. I do not see any objection to a man making as much as he can out of what he is honestly entitled to; but, at the same time, it is not so pleasant to pay. I never heard of the asphalte gentlemen being summoned. It is a very difficult thing to obtain a conviction at all, but at last we succeeded.

Mr. *George Wilson Stevenson*, examined by Mr. SOMERSET.

I have been down to Exeter and examined the works, which could not be in a worse state than when I inspected them. I think the capital proposed is a great deal too much to be granted at one application, as I think it is advisable that Gas Companies should be compelled to come to Parliament every 10 or 12 years; whereas I should think this capital would last the Company from 20 to 30 years. I should think £100,000 is the extreme which should have been asked for. I mean £100,000 of share capital; because, if offered under proper conditions at public auction, that would realize £140,000, supposing it to bear 7 per cent. dividend. I would give them borrowing powers not to exceed 5 per cent.; but I would exclude the power to create preference stock, or to issue preference shares, because they would have a dividend of 6 per cent.—or, perhaps, 5 per cent.—upon preference stock, which the Proprietors would allot amongst themselves. The object of the auction clauses is as much as possible to bring new blood into the concern, and to give the public an opportunity of investing their money. The proviso by which they are limited to offering £50,000 worth of shares, nominal value, in one year, is very well; but I think they ought to be limited to offering not more than £10,000 worth of shares in three months, because they might put the whole £50,000 in the market at one auction, and the consequence would be that the market would be glutted, and the present Proprietors, who alone would know the value of the stock, would buy it up. There is a further clause in the Bill which provides that if the shares offered at public auction be not sold at the time, the shares are to be offered to the Proprietors, under the Companies Clauses Act, so that the direct effect of flooding the market would be to bring into operation the provisions of that Act. I would strike out from the Bill everything relating to the purchase of shares by tender, because it is a semi-private sort of way of disposing of the shares; and I think it is a good thing that the actual value of property of this kind should be known by the public, and that the public should have an opportunity of investing their money in it.

The CHAIRMAN inquired whether the auction clauses were not ordinary clauses.

Mr. MICHAEL said they were, and had been settled by Lord Redesdale.

Mr. SOMERSET: That is to say, they are admitted into the Bill for the consideration of your lordships.

Witness said they only became general last year, and there was a Standing Order of the Commons last session that the shares of an established Gas Company should be offered at public auction, unless the Committee otherwise decided, and gave their reasons.

Mr. SOMERSET: It is not at all impossible that when the ingenuity of gentlemen has been turned to this, they may have to be altered next year?

Witness: They have been altered already in this respect, that when first brought out these clauses had no limitation as to the number of shares that might be offered at one auction, so that £50,000, or the whole of the capital, might be offered in one lot, which would, of course, have destroyed the intended effect of the clause.

Mr. MICHAEL: Not in this Bill?

Witness: No.

Mr. SOMERSET: And the proviso about the £100 in one lot is to meet that difficulty?

Witness: Yes.

Examination continued: I consider the standard price of 4s., as inserted in the Bill, to be 6d. too high. The accounts show that 2s. 10d. per 1000 feet was the actual cost last year of the gas at the consumers meters; the sum required for dividend is 1s. and a fraction of a penny, and 2s. 10d. and 1s. put together are 3s. 10d. What they charged for repairs and maintenance of works last year was excessive—very much beyond what would be required in an ordinary state of things; there ought to be 4d. per 1000 feet taken off for that item alone, and 4d. from 3s. 10d. leaves 3s. 6d. as the standard price. I quite admit that the Company may have been under the necessity last year of spending this large sum of 9d. per 1000 feet upon repairs and maintenance, because their works were in a very bad state; but the average should be taken of a series of years, in order to ascertain the proper expenditure under that head, and, consequently, the proper standard price. Mr. Penny said he would not take off the 4d., but I think he ought to have done so. The testing-place for Exeter ought to be in the centre of the city, where the consumption goes on—at the Guildhall, in the centre of the High Street, or anywhere about there, which would be from half to three-quarters of a mile from the works. There is a great variety of opinion whether gas does lose in illuminating power at all from transmission through pipes. I heard it stated a fortnight ago that the gas actually gained by being sent through miles of pipes, but, of course, I do not believe that. The practice in the Metropolis is to test it at least 1000 yards from the works.

Mr. MICHAEL said that, if it was desired that the testing-place should be in the centre of the town, the Company would be most happy to assent.

Examination resumed: As to the illuminating power, if the Company retain their present standard burner, I should say they ought to keep their standard at 14 candles; but if they adopt a standard burner for measuring the illuminating power, which gives them nearly two candles better light, as they are proposing to do, they ought to put on two candles extra, and make it 16.

Cross-examined by Mr. MICHAEL: I believe the burner prescribed by the Act of 1865 was a 15-hole Argand, with a 7-inch chimney; but the present Bill prescribes Sugg's "London" Argand burner, No. 1, with a 6-inch by 1¾-inch glass chimney, and that burner has 30 holes. It is the burner prescribed by the London Referees, but for 16-candle gas, and I should, as an engineer, use a different burner to test a 16-candle gas than for a 14-candle gas.

Mr. MICHAEL: Do you mean to say there are burners employed over the country of a different character for each single candle?

Witness: No; not over the country, but by Mr. Sugg. He makes a different burner for every candle of illuminating power, and shows an appreciable difference between the illuminating power by each burner.

But whenever the power is 14 candles, is not that the test used?—I believe it is, generally.

Supposing 3s. 6d. were adopted as the standard price, according to the accounts upon which you base that, this is the very cheapest time for the manufacture of gas?—It is at a cheap time; but I have known coal a little lower than it is now. I cannot tell whether it is going to continue as low.

Supposing it were to increase, could gas then be supplied at 3s. 6d., and pay maximum dividends?—Not if it increases much, except by care and skill, and management.

Are you aware, supposing 3s. 6d. were adopted, that there is an obligation on the Company to supply gas to the public lights at 3s.?—Yes; I think a very improper obligation.

Is there any clause proposed by the Company to get rid of that obligation?—I am not aware that there is, but I think it is extremely improper that the ratepayers should receive the benefit at the expense of the consumers of gas. I have always said that the public lamps ought to be supplied at the lowest price charged to any private consumer.

I do not now at all disagree with you on the justice of the matter, but the fact is, as at present constituted, the Company are bound to supply at 3s. If 3s. 6d. is the price, then the price which would be realized by the Company would be something between 3s. and 3s. 6d.?—I do not know that. You put in a working statement of the cost of gas, and from that I ascertain that the whole of the gas is supplied at 2s. 10d. per 1000 feet.

But that is the cost; that has nothing to do with the money realized?—I do not suppose it has.

Then why do you answer my question by something diverse from it? When a part of the gas only realizes 3s., and the other part 3s. 6d.—and 3s. 6d., according to your account, is required to pay the dividend—can the dividend be paid when a less sum is realized than 3s. 6d. over the whole?—No.

Can you tell the Committee of any one case, since the establishment of the sliding scale, in which Parliament have fixed a lower price than the price absolutely charged at the time?—Yes. It was fixed at a considerably lower rate in the case of Ashton-under-Lyne last year. I believe the standard price was fixed at 3s. 8d. I do not remember the price previously charged, but it was not 4s.

Can you conceive any way where the intention to sell is made so public, and such limitations are placed upon the Company, by which it is possible for the Company, as against the consumers, to acquire that capital without having the whole amount of the premiums to put into the concern?—If the sections are honestly worked, the result will be that the premiums will come in with the shares, and these will go to the extension of the works without bearing dividend.

Therefore, if there is to be any disadvantage it must be by dishonesty?—Ingenuity; "dishonesty" is rather a bad expression.

Re-examined by Mr. BROWNE: Would "financing" do it?

Witness: There are crooked ways in which even Acts of Parliament may be avoided.

You say that Mr. Sugg has a different burner to test every gas that is different in illuminating power?—Yes; I have myself 30 or 40 burners applicable to different qualities of gas.

If this Committee fix 3s. 6d. as the standard price, do you think it is possible that, with care and skill, the Company may be in a position at some future time to increase their dividend?—I am quite certain they would. Mr. Padfield said yesterday that the Company sacrificed £1500 a year by their contract on ammoniacal liquor; and if they take the manufacture of the products of ammonia into their own hands, they will increase their income by this £1500 a year. Their leakage is now nearly 20 per cent., and that ought to be reduced to 7 or 8 per cent. in a place like Exeter.

The object of the sliding scale is to necessitate that care and skill which have not hitherto been brought to bear on these works?—Yes; and I think it will have the effect of compelling the Company to do what is necessary to their works. They have shown an extreme indisposition to spend money when the expenditure of it would have been really of advantage to themselves.

I suppose if too high a standard price were fixed it is merely giving a bonus to the Shareholders at the expense of the consumers?—That is obviously so.

Do you think they could afford to charge so low a sum as 3s. 6d. if they continue to charge 3s. for the public lights?—No; I mean 3s. 6d. all round. I think the exceptional contract in favour of the public lighting is an improper one; but that contract will come to an end some time, and then, if anything beyond 3s. 6d. were fixed, the Company would get an advantage incidental itself to the termination of that contract.

Mr. *Thomas B. Purnell*, examined by Mr. BALFOUR-BROWNE.

I am a coal merchant carrying on business in Exeter. From my experience I think I could supply the Exeter Gas Company with coal to produce 10,000 feet of 14-candle gas at 16s. 3d. per ton, delivered on the works—that is taking the present prices. I even think I could supply them with New Pelton coal at a cheaper rate. I chartered a vessel on Monday for that very coal, and this morning I received a message to say that for such large quantities they would be prepared to take less. I think the Weatherhead coal could be supplied at 12s. in the works; but I could not say positively, as one merchant in Exeter has the monopoly of it. There is a difference of about 6d. per ton in the supply of the same coals at Plymouth, which would be a fraction over a halfpenny in the cost of each 1000 feet of gas.

Cross-examined by Mr. PITT LEWIS: I have had no experience in gas-making; but I have supplied New Pelton coal to Taunton, and I have the Gas Manager's authority for stating the illuminating power. Freights are very low now—£6 5s.—about the same as they were before the coal famine. I do not think it is likely that coal will go up so high again, for the simple reason that there are such a number of new collieries springing up. I am not aware that the Company all last year paid 17s. 3d. per ton, but it is very likely, as I paid a little more myself.

Mr. *Henry P. Boulnois*, examined by Mr. BALFOUR-BROWNE.

I am City Surveyor to Exeter, in which capacity I have had many complaints of smells arising from the gas-works. On many occasions I made a point of tracing those smells to the works, and I have no doubt whatever the nuisance arose from that source. In my opinion the viaduct proposed to be made by the Company would interfere with the export of timber from the quay; a tramway would be better for the Corporation, and as good for the Company. One piece of land purposed to be taken by the Company, it would be very objectionable for the Corporation to part with, because it would limit the export trade of the future.

Cross-examined by Mr. PITT LEWIS: There would be no engineering difficulty in throwing the viaduct across the road with a single span.

Mr. *Stevenson* was recalled, and in answer to Mr. BALFOUR-BROWNE, said that, according to the working statement prepared by Mr. Spice, the private consumption was first given at 4s. and at 3s. 9d. The public consumption was 15,696,000 feet, and 99,530,000 feet was the private consumption. A difference of 6d. per 1000 feet on the public lamp consumption amounted to £392 a year, and 1d. on the private sale was equal to £415, so that 1d. per 1000 feet on the gas sold to the private consumers a little more than covered the 6d. difference between the price charged to the public lamps and that charged to private consumers.

Mr. *Bartholomew C. Gidley*, examined by Mr. BALFOUR-BROWNE.

I am Town Clerk to the city of Exeter, and at one time was Mayor of the city. As Town Clerk my attention has frequently been called to the nuisance occasioned by the gas-works. Complaints were made that the gas caused an irritation of the eyes, and that the light was poor. The testing clause introduced into the Act of 1865 has been simply illusionary, and no protection to the public. There have been three prosecutions against the Company under the Public Health Act for nuisance under the terms of section 114. They have also been proceeded against once under the testing clause of their Act of 1865. With regard to the prosecutions under the Public Health Act, the first was abortive. The Council decided to call no scientific witnesses, and they simply produced a number of persons who had suffered annoyance from the stench, and who conceived that they had satisfactorily traced it to the works; but some of the witnesses were most particular in fixing a special chimney on the works as the source of the nuisance; and as the Company satisfactorily showed the Justices that no stench could possibly emanate from that chimney, they decided that the case against the Company had not been established, and the summons was dismissed. On the other two occasions the Company were in each instance convicted, being fined, on the first occasion, £5, and, on the second, £10; and they did not appeal against those convictions. I have been over the works once, and, so far as I was able to judge, they were then in a very unsatisfactory condition. I examined the asphalte-works on two occasions, and there was certainly no annoyance whatever while I was there. Their process is merely a simmering of tar—it never reaches a boiling point—and then it is worked up with ashes or clinkers to manufacture a kind of tar pavement or asphalte. In my examination I was accompanied by other persons. We discovered defects in the scrubbers, and complained to the Company. Since then new scrubbers have been erected. The Corporation object to the increase of capital proposed by this Bill, because they believe that the necessity for so large a capital must cause the maintenance of a high price for the gas. There has been a growing feeling for some years that the gas supply should be in the hands of the Sanitary Authority, and the Council would be willing to treat with the Company; but the passing of this Bill would make any such negotiations more difficult. The Corporation do not desire to part with the land which the Gas Company wish to acquire. The contract for lighting the public lamps is terminable any Michaelmas by giving three months notice.

Cross-examined by Mr. PITT LEWIS: The public lamps are supplied at so much per lamp, based upon a calculation of 3s. per 1000 feet. The Company cannot get rid of that 3s. price by a three months notice, because it is the price stated in the Act of 1865.

By the CHAIRMAN: By section 39 of their Act of 1865, the Company are to supply gas at the lowest price at which they charge any private consumer, provided that that price should never exceed 3s. per 1000 feet.

Cross-examination resumed: It has been clearly ascertained how much each lamp burns, the quantity having been tested by means of a meter. The Surveyor worked out the figures very carefully some time since, and he told me that it came out exactly 3s. per 1000. The gas was tested in several parts of the city to obtain the average. Negotiations for the purchase of the works went on for two or three years, and last summer terms were practically agreed upon, but the Council were scared by the electric candle. Alderman Follett made an eloquent speech in the Council, and moved a resolution—"That, in view of other inventions for the supply of light, it is unadvisable to continue any negotiations for the purchase of the property of the Gas Company." The negotiations were then, of course, broken off; but the Council have considered the matter this morning with a view to our position, and they have recovered from the temporary panic under which they passed that resolution.

By the CHAIRMAN: The Council have come to a resolution authorizing the Sub-Committee, who are here in charge of the opposition, to treat with the Company if they desire to do so.

Cross-examination resumed: There must undoubtedly be a considerable expenditure upon the gas-works.

Re-examined by Mr. BALFOUR-BROWNE: Looking at the difference of modern legislation, I cannot disguise from myself the fact that before many years are over these works will be in the hands of the Corporation; and I think it would be for the advantage of all parties—the consumers, the Corporation, and the ratepayers generally—that the heaviest sum that must be laid out on those works should be laid out under the control of the parties who will ultimately possess the works.

Mr. BALFOUR-BROWNE said that was the case for the Corporation of Exeter against the Bill.

Mr. MICHAEL, in replying upon the whole case, said there were but three points to which he wished to direct their lordships attention. The first and most important was, What was the amount of capital which, in the interest of the consumers—putting the Company out of the question altogether—ought to be expended? The ratepayers were amply protected by the Gas-Works Clauses Act of 1871, which, while it gave some small boon to the Gas Company in the way of enabling them to recover debts, and settled some matters as to security for gas-rents and things of that kind, was in reality an Act providing that gas of good illuminating power, and of sufficient pressure and purity, should be supplied within the limits of the gas undertaking. It, moreover, gave every consumer, for the first time, an opportunity of obliging the Company to supply gas within specified limits; and, therefore, by the Bill now before their lordships, if passed into law, there would be additional securities given to the consumers which they never before enjoyed. With respect to public lights, the Act also provided that if any difficulty arose, the point in dispute should be settled by arbitration, and the present Bill did not propose to alter that, which was a great benefit. He (Mr. Michael) quite agreed with Mr. Stevenson, that it was unjust to the gas consumers that the interest of the ratepayers should be considered, and a rate charged for the public lamps in diminution of that which the consumers paid who took the largest quantity. However, that did obtain in the present case; the Town Council, although anxious to protect the consumers, were quite ready to protect the interests of the ratepayers, and they did not ask that the differential rate should be removed. It was, therefore, an important question to be considered, when they had to look at the question of the standard price to be inserted in any Bill, in order to protect the Company and the consumers.

The CHAIRMAN remarked that the differential rate was settled under the private Act of 1865.

Mr. MICHAEL said that was so. The Company were obliged to supply at 3s., and they did not ask to be relieved from that obligation. Indeed, it did not much matter; it was a question which did not affect the Company, but affected the consumers and the regulations existing for gas supply up the reception of the maximum dividend; and beyond that the Gas Company were in reality made to stand in the position of trustees for the consumers. Then they came to the auction clauses and the sliding scale. It was alleged that the expenditure of capital by Gas Companies, being subject to no restriction whatever, when a Gas Company were in a position to pay maximum dividends, and have a profit beyond, which they could not divide amongst their shareholders, there was an inducement to expend capital which might be unnecessary, in order that the profit beyond the maximum dividend, which the capital earned, should be distributed, although the capital was not necessarily required for the undertaking. That was really the reason which induced Parliament last year to adopt the Standing Order requiring that all capital in future should be raised under the operations of auction clauses. With regard to the Exeter Gas Company, they had, no doubt, acted wrongly and foolishly in not applying to Parliament earlier, but who had been damaged by that but the Shareholders? Supposing the Company, as they should have done, had applied to Parliament four or five years ago, they would have obtained additional capital of £100,000, upon which the dividend, according to the rate then prevailing, would have been 7½ per cent. The absolute value of money in gas undertakings now ranged from 4½ to 5 per cent., so that the Shareholders had in reality lost 2½ per cent. through waiting till 1878 before making their application for increased capital to meet the growing requirements on the part of the consumers. Therefore, when it was said that a large amount of money had been expended year by year for the purpose of preventing depreciation of the works—that was maintenance of structures and keeping in repair the various portions of the works—that had come out of the pockets, not of the consumers, but of the Shareholders, and the consumers had had gas much cheaper on that account, because the capital paying dividend did not really represent the

capital earning that dividend. The Company now asked their lordships for a sum of money which Mr. Stevenson acknowledged to be necessary, because it made little difference whether the Committee gave £133,000 which Mr. Stevenson fixed—viz., £100,000 and the usual borrowing powers—or the sum now asked for. The only thing which would enure to the disadvantage of the Company was that if the smaller sum were granted, a shorter time would elapse before the Company again applied to Parliament for further powers, and that really meant embarrassing the Company with the expense of a further contest. They made their present application at the behest of the Corporation, in order to have more modern works; and, in order to make gas cheaper and better in future, they were called upon to imperil the dividend they now had by the expenditure of money which might not bring in a proper dividend. They were at the present time in the best condition for making gas; it was a cheap time for coal, and so on, but a time might come when an increased price for labour and for coal would make the production of gas dearer, and what would be the result? The Company would be burdened with additional capital, on which they would only be able to pay dividend by the greatest economy, and therefore it would be better for them to remain without the expenditure of a single farthing. But they had pledged themselves that that sum should be expended, and they would be obliged to fulfil their obligations, and remodel the works in the interest of the consumers. Whatever money was expended could do no good to the Shareholders, while it would tend to the production of cheaper gas, because all the money to be raised in future could only be raised at 5 per cent. His learned friend said that it was possible some private information could be given to the Shareholders, and that they would come with money in their pockets and buy up the whole £50,000; but, by the 10th section, the greatest publicity was obliged to be given, not merely in the locality itself, but the intention must be communicated to the Secretary of the London Stock Exchange at least 28 days before the time of auction or of tender, besides giving public notice in the newspapers for 28 days. Moreover, having regard to a way by which Gas Companies might possibly have managed to evade those provisions, they were obliged within three months to call up the whole of their share capital, and therefore there was no possibility of loophole on the part of the Company by which the public could be in any way damaged. He (Mr. Michael) would now consider the second matter, which was really the *crux* of the whole case. What was the standard price which ought to be fixed? Was it right that the Company should be cut down to 3s. 6d., a price which, according to the evidence of Mr. Stevenson himself, would not be sufficient to pay the maximum dividend on the old capital? If that price were fixed, it was quite clear that where a portion of the supply only realized 3s., the total must be less than 3s. 6d., and more than 3s. Looking at the matter in another way, supposing 3s. 6d. were proper for to-day, the whole of the new capital had its dividend to be provided for. The Company were going to spend, in the next seven years, £100,000 in the interests of the consumers, and unless they could make gas cheaper, the whole of that £100,000 was left without one penny of dividend, because at the present time, at the price of 4s., they had not sufficient to pay 10 per cent., and they had not had sufficient in times past. Their lordships would consider there ought to be some margin, and the Company asked but a very small one beyond the absolute price at which gas was supplied; and they asked that the Committee would fix such a price as would, in all contingencies, ensure to them that moderate sum, and that would not have to suffer because the needs of the city called upon them to spend new capital. The last point was, Ought the Town Council, under these or any circumstances, to call upon the Company compulsorily to part with their undertaking—not by agreement, not for a fair price fixed by the parties, but, after having had to endure the whole of the enormous expense of arbitration, to be subject to a compulsory parting with their own property? There had been no single case in which Parliament had sanctioned such a proceeding. They had been willing in time past to part with their undertaking upon a fair agreement. They were willing to insert a clause agreeing to part with their undertaking upon fair and equitable terms; they were willing at any future time to enter into a treaty with the Corporation; but they did object to the Corporation being able to come upon the undertaking at a time when the Company were at their worst, and that they might be liable to be called upon to part with their property at a price ruinous to the Shareholders, because it was not the capital which regulated the price to be paid—it was the sum calculated upon so many years purchase of the profits earned. What was the history of the matter? The Company were endeavouring to carry on their works at the smallest cost; the Council desired to possess that undertaking; an agreement was arrived at between the parties; the agreement was suddenly broken off by one of the parties because they thought that the electric candle would render unnecessary the supply of gas. Had the Town Council done anything to entitle them to ask for exceptional legislation to possess themselves of the gas undertaking? Their lordships were asked to protect the Shareholders who had invested their money on the faith of a parliamentary guarantee; they had invested it because Parliament had said, "You shall have this undertaking so long as you conduct yourselves properly." That was the undertaking, and a *quasi* monopoly of the supply. When they had had an opportunity of deriving large profits from the sale of shares, they had not put that money into their own pockets, but had sold the shares and put the premiums derived from such sale into the undertaking, which had enured to the advantage of the consumers. Upon the merits of the case, and upon all antecedent legislation, he (Mr. Michael) was entitled to ask their lordships not to insert a compulsory clause depriving the Company of their property; but he asked the Committee to pass the Bill, because it would enure equally to the benefit of the ratepayers and the consumers of the city of Exeter.

The Committee-room was then cleared. After a short time the parties were called in, and

The Chairman said the Committee were prepared to pass the preamble of the Bill on the understanding that the capital to be raised was reduced to £100,000, with borrowing powers in addition; and that in clause 5 such arrangements were made as would prevent the whole of the £50,000 from being thrown into the market at once, but that it should be divided into four or five portions. The Company would also be required to have a testing-station at a convenient place, in the centre of the town, to be agreed upon. The standard price would be allowed to remain unchanged, on account of the low price charged for the public lights.

Thursday, March 7.

The clauses were read and agreed to, with amendments, and the Chairman was directed to report the Bill to the House.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 5.

(*Before Mr.* Pease, *Chairman; Mr.* Carpenter Garnier, *Mr.* W. E. Denison, *and Mr.* Biggar.)

BANGOR LOCAL BOARD BILL.
BANGOR WATER AND GAS BILL.

Mr. Cripps, Q.C., Mr. Richards, Q.C., and Mr. O'Hara appeared for the Local Board; Mr. Pope, Q.C., Mr. Michael, and Mr. Chandos Leigh for the Water and Gas Company.

Mr. Cripps, on the assembling of the Committee, applied for a short adjournment, as there was, he said, every prospect of an arrangement being come to between the parties.

The Chairman said that, after taking the appearances on the Bills, the Committee were willing to adjourn to the following Friday.

The petitions against the Bills having been read,

Mr. Cripps said he was able to announce that an agreement had been come to, the terms of which, however, he was not in a position to state. He thought the proper course would be to call a witness formally to prove the preamble of the Local Board Bill, so that the Committee could report it to the House, and adjourn the discussion of the clauses. The Company's Bill would, of course, be withdrawn.

Mr. *Henry Barber* was then called, and, examined by Mr. Cripps, said: I am Solicitor for the Local Board in the promotion of their Bill. I have read the preamble of the Bill, and think it would be to the advantage of the town of Bangor if the works of the Company were handed over to, and managed by, the Local Board.

By the Chairman: There is a considerable majority of the Board in favour of the transfer. The Board, I may say, are almost unanimous. If there was any dissention, it was confined to one member. There are nine members on the Board. The terms of purchase have been approved by the advising Engineers for the Board.

Mr. Chandos Leigh having announced the withdrawal of the Company's Bill,

The Chairman declared the preamble of the Local Board Bill proved, and adjourned the consideration of the clauses till the following Friday.

Friday, March 8.

On the assembling of the Committee this morning,

Mr. Michael said he had, on behalf of the Company, to appeal to the Committee to vary the agreement which had been come to on Tuesday, on the ground that he had misunderstood his instructions. The terms then come to were ordinary terms. They were that the Local Board should pay in perpetual annuities the maximum dividend to which the Company were entitled; that all debts and assets of the Company should be taken over by the Local Board as from the 1st of January last; and that the Local Board should pay the expenses of the Company in promoting their Bill in Parliament, and in opposing that of the Local Board. The expenses had been fixed at £800, and it was agreed that the Local Board should elect whether they would continue to employ Mr. White, the Manager of the Company, or pay to him, in lieu thereof, such sum as compensation as might be fixed. The learned Counsel went on to explain that, in fixing £800 as the amount of the costs to be paid by the Local Board to the Company, he had exceeded his instructions. The difficulty was that the costs of the Company exceeded the £800, and as the assets of the Company were taken over by the Board as from the 1st of January last, there was no fund out of which to pay the balance of the expenses. The understanding of the Company with the Board was that all the parliamentary expenses of the Company should be paid by the Board, and £800 was fixed in the belief that this sum would cover the entire expense. He had gone beyond his powers in agreeing to £800, and now appealed to the Committee for assistance.

Mr. Richards said that whilst regretting the difficulty in which the Company found themselves, he must oppose any alteration being made in the agreement, which had been come to deliberately, and after constant references between Counsel and their clients. Clauses had been prepared to carry out the agreement come to, and he asked that it should not now be in any way varied.

Mr. Michael said if the Company insisted upon it, having misunderstood his own powers, he must apply to have their Bill re-committed. He did not share in the opinions of his clients, for he believed that the arrangement carried out their instructions to him. The difficulty could be met if the Local Board would consent to alter the date of the transfer to the 1st of January in next year, as this would enable the Company to pay the balance, which would not exceed £500, out of current profits.

Mr. Richards maintained that Counsel had absolute power to settle, and quoted cases in which the power of Counsel to settle for client had been upheld, and in one case the client was not even present. In this case an arrangement was come to on the Tuesday, and it was not until Thursday that any opposition was announced. It was impossible for him to consent to a revision of the terms of that arrangement, as most of the members of the Local Board had returned to Bangor. The arrangement as to costs was come to deliberately, and after frequent references. At first the Board offered £500 towards the Company's costs, and afterwards £800. The latter sum was accepted by the Company, and he protested against the Company repudiating the arrangement simply because their costs came to £200 or £300 more than they had expected.

Mr. Michael said if the Board would make no fresh arrangement, his his only course was to ask the Committee to help him to get the Bangor Water and Gas Bill re-committed.

The Committee-room was then cleared; and, on the parties being called in,

The Chairman said the Committee had decided they could not ask Parliament to re-commit the Bill.

Mr. Michael said he would make a last appeal to the Local Board to enter into a new arrangement. If they declined, the Company would either have to oppose the new clauses or the whole Bill in the House of Lords. He appealed to the Board not to incur an expense four times as great as that required to settle the present dispute.

Mr. Richards said he was not anxious unnecessarily to spend a single penny. The Board would go on with the new clauses, which would be found to carry out exactly the arrangements come to.

The Counsel for the Company then withdrew, reserving their opposition to a later stage of the Bill.

The new clauses were read and agreed to, and the Chairman was ordered to report the Bill, as amended, to the House.

Hull Gas Supply.—Mr. James Baynes reports that the gas sent into the district of Sculcoates and Myton during February, by the British Gas Company, gave the following results, free ammonia and sulphuretted hydrogen being at no time present to the ordinary tests:—

	Max.		Min.		Mean.
Illuminating power standard sperm candles	16·40	..	15·01	..	15·81
Grains of sulphur per 100 cubic feet . . .	31·00	..	27·00	..	29·30
Grains of ammonia per 100 cubic feet . .	—	..	—	..	0·50

Mean barometer, 30·20; Temp., 54°.

Sales of Provincial Gas Shares.—At Richmond (Surrey), on the 6th inst., there were sold by public auction 100 new £10 shares in the Richmond Gas Company. The shares were put up in ten lots, and realized the following prices:—Lot 1, £130; lot 2, £120; lot 3, £125; lot 4, £125; lot 5, £115; lot 6, £122 10s.; lot 7, £120; lot 8, £122 10s.; lot 9, £120; and lot 10, £122 10s. On the 14th inst., £525 Margate Consolidated Stock—Isle of Thanet Gas Company—on which a dividend of 7½ per cent. is paid, was offered for sale by auction in nine lots, and realized £1200. On the 15th inst., £70 of preference stock in the Lincoln Gas Company was sold by auction for £87.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

FRIDAY, MARCH 22.

(*Before the* MASTER OF THE ROLLS.)

ROSE *v.* WOODFORD LOCAL BOARD.

Mr. MARTEN, Q.C., in moving, on behalf of the plaintiff, to restrain the defendants from discharging, or permitting the discharge of, foul matters from any of the sewers under their control into the River Ching, so as to pollute the water of the river, or render the same offensive or unfit for use where it passes the plaintiff's property, said: The plaintiff is the owner and occupier of a house called "The Laurels," which contains, besides the dwelling-house or mansion, about 25 acres of land, adjoining the River Ching, within the district of the Woodford Local Board.

Mr. CHITTY, Q.C. (who appeared for the defendants): The discharge of sewage has been going on a great many years, and an application has been made by the plaintiff to the Local Government Board.

Mr. MARTEN: They have made a suggestion. The Local Government Board, in a letter of the 11th of March, have pointed out that you may obtain land by which you may purify the sewage before it comes into the river.

Mr. CHITTY: It is hardly a subject to be discussed upon interlocutory motion.

Mr. MARTEN: I am quite willing that the defendants should have time; but this has been slowly accumulating by the laying down of pipes which have sent sewage into the river.

Mr. CHITTY: The pipes have not been laid down by the Local Board, but by somebody against whom the Local Board proceeded.

Mr. MARTEN: The sewers are vested in the Local Board, and they are bound by Act of Parliament to purify the water.

Mr. CHITTY: I do not think we can dispose of this for any useful purpose on motion for injunction. Let the motion stand over.

Mr. MARTEN: If you will undertake not to do anything in the way of causing further pollution. Will you proceed at once to carry out the suggestions of the Local Government Board?

Mr. CHITTY: We have not arranged our plans, and there is a serious question with regard to your right to the water, and so on. It is within the Epping Forest district, and the Local Board desire to wait until the Act of Parliament is passed.

Mr. MARTEN: If you will put in your statement of defence in a day or two, we can file in our reply, and the matter can be tried these sittings. Our house has nothing at all to do with Epping Forest. The defendants say they are not quite certain what the area ultimately will be within their district for the purpose of draining; but our land is within their district, and has nothing to do with Epping Forest.

The MASTER of the ROLLS: They cannot have a right to pollute a river.

Mr. MARTEN: They must undertake not to cause any further pollution. For five years they have done nothing but correspond. We have had an inquiry by the Local Government Board, and the defendants have made all sorts of excuses.

Mr. CHITTY: As far as we know, nothing is likely to occur to increase the nuisance.

Mr. MARTEN: I have an affidavit from an analytical chemist, a local physician, a gardener made very ill last year, and a cowman whose cows have been poisoned. There is also an affidavit of that great authority, Mr. Bailey Denton.

Mr. CHITTY: The Local Board do not intend to increase the discharge. If any new houses are built, and they drain in the river, the Local Board may not be able to prevent it.

Mr. MARTEN: The Local Board are bound by Act of Parliament to make proper sewers.

The MASTER of the ROLLS: They will undertake that they will neither make themselves, nor permit any new connection with any sewer or drain, or any other connection whereby any foul water or sewage can be poured into the river.

Mr. MARTEN: Very well.

The MASTER of the ROLLS: The costs will be costs in the action.

ESSEX LENT ASSIZES.—WEDNESDAY, MARCH 20.

(*Before Justice* MANISTY *and a Special Jury.*)

WALKER *v.* THE GASLIGHT AND COKE COMPANY.

Mr. WILLOUGHBY and Mr. CRISPE were counsel for the plaintiff; Mr. WILLIS, Q.C., and Mr. PAINE for the defendants.

This was an action to recover damages for personal injuries alleged to have been sustained through the negligence of the defendants servants. The defendants pleaded that at the time of the accident the plaintiff was in their service, and attributed the accident to his own negligence.

The evidence for the plaintiff was that before the accident he was a stevedore, earning about 30s. a week, in the service of Messrs. Westwood and Bailey, engineers. He was 30 years of age, married, and had two children. In the summer of last year he was engaged, with others of Messrs. Westwood and Bailey's workmen, in erecting a steam lift at the works of the defendant Company at Bromley-by-Bow. For this purpose they put up a derrick, or upright mast, kept in equilibrium by four ropes and a quantity of staging. On the 16th of July some workmen in the employ of the Gas Company also put up a derrick, which, it was alleged on the part of the plaintiff, was erected by incompetent men, who performed their work so unskilfully that first of all it toppled over into the adjoining canal, and was subsequently being adjusted in such a clumsy manner that it fell against the guy rope of Messrs. Westwood's derrick, causing it to fall against the staging, and displacing certain planks, 14 feet long and 4 inches wide, which fell from a height of 22 feet upon the plaintiff, who was working below. They struck him upon the neck and shoulder, and he was picked up in a sad condition. He was for a considerable time under treatment in the London Hospital. It was found that he was suffering from wry neck, the left side of the body was paralyzed, there was partial paralysis of the spinal cord, the left arm was wasting, and there were other serious injuries. His weight had fallen from 13 st. 3 lbs. to 9 st. 6 lbs., and it was believed that he would be permanently incapable of any physical labour.

Mr. *Reeves* and Mr. *Harold Palmer*, two gentlemen connected with the medical staff of the London Hospital; Dr. *Abbott*, Consulting Surgeon to the East London Dispensary; and Mr. *Clarke*, a surgeon attending that dispensary, were called on behalf of the plaintiff. They all described the injuries as being of a most serious character, and as being in all likelihood permanent. In reply to Mr. WILLIS they said they did not think the plaintiff had shammed, or exaggerated his injuries, although the case presented some unusual features.

Mr. WILLIS, in addressing the Jury for the defence, intimated that he should call evidence to show that there was no want of due and proper care on the part of the defendants servants, that the accident was not of the serious character that it had been represented to be, that the plaintiff had shammed, and that, in point of fact, he would probably soon be able to undertake some light employment.

Mr. *Rivington*, Consulting Surgeon to the London Hospital; Dr. *Jackson*, Physician to the London Hospital and to the National Hospital for Paralysis and Epilepsy; and Mr. *Hutchinson*, Senior Surgeon of the London Hospital, were then called. They all stated, from careful observation, and examination of the patient, that they were fully of opinion he was malingering or shamming. It appeared also that when the plaintiff first presented himself at the hospital the case was regarded as an unimportant one. It was not until a few days later that he became an in-patient.

Several workmen were also called, who stated that all reasonable precaution was taken with the derrick, the rope of which slipped through being wet with rain, and that the derrick of Messrs. Westwood and Bailey was not so secure as it ought to have been.

Mr. WILLIS contented that the plaintiff's case had been fully answered.

Mr. WILLOUGHBY said the defence set up was one which invited criticism. It meant, not only that the plaintiff was shamming, and conspiring to get money out of the Company by a verdict, but, *à fortiori*, that the medical gentlemen who had given evidence on his side were co-conspirators with him, and were trying to palm off on the Jury a grossly fraudulent and dishonest claim. These charges were not justified, and the common sense of the Jury would prevent them from believing that the alleged shamming had been going on, and been propped up, since the 16th of July last. He confidently anticipated that the Jury would find this was a genuine case, and give the plaintiff substantial damages.

His LORDSHIP summed up with great care. In reference to the medical evidence, he said it was often asked, When doctors disagree, who shall decide? Well, he knew of no tribunal which could decide except a Jury, and he had no doubt the Jury before him would decide the difference in this case satisfactorily. When they found able medical men of high reputation differing as they had differed in this case, they must summon common sense to their aid, for common sense was not to be put aside in a case of this kind. They had seen the plaintiff in the box, they had seen all the other witnesses, and they would be able, to some extent, to form a conclusion, from their own observations, on the question of malingering or otherwise.

The Jury, after a short absence to consult, found a verdict for the plaintiff—damages, £1050.

PORTSMOUTH BOROUGH COURT.—WEDNESDAY, MARCH 13.

(*Before Mr.* W. H. GARRINGTON, *Mr.* W. PINK, *and Captain* HODGKINSON.)

PROSECUTION OF A GAS COMPANY FOR SUPPLYING GAS OF DEFICIENT ILLUMINATING POWER.

The Portsea Island Gas Company were summoned by the Corporation for having, on the 15th of November last, supplied gas of a less illuminating power than it should have been according to their Act.

Mr. WARNER SLEIGH (instructed by the Town Clerk) appeared for the prosecution; and Mr. HENRY FORD (instructed by Mr. J. Douglas, the Secretary of the Company) was for the defence.

Mr. WARNER SLEIGH, in opening the case, said the information was laid at the instance of the Corporation, for a breach by the Company of the Act of Parliament under which they exercised certain privileges and certain rights in the carrying out of their business as manufacturers of gas. He thought it would be unnecessary for him to allude *in extenso* to the several Acts bearing upon the matter, and that it would be sufficient for him to refer to the Gas-Works Clauses Act of 1871, and the Company's Provisional Order of 1872. As to the authority under which the summons had been taken out, it was provided that the testing of the gas should be made by an Examiner appointed under the statute, he being allowed to test between five and ten in the evening during the summer months, and between eight and ten in the winter months. That testing had to be performed according to certain rules which were very clearly set forth in the schedule of the Act of 1871; and Mr. Moncreaff, the Examiner, would tell them that he had acted in strict accordance with those rules in order to come to a proper result. The Examiner having effected his tests, was directed to furnish a copy of his report to the Company upon the day immediately following; but he frankly admitted that, in the present case, he did nothing of the kind, although it would be shown that the Company's agent had a report of the examination at the time. He (Mr. Sleigh) made this explanation because he did not wish it to be said that he was keeping anything back, or that he was hiding any of the circumstances. On the 15th of November, Mr. Moncreaff tested the gas at the Company's testing-house in West Street, Southsea, so as to arrive at a result in accordance with the Company's Provisional Order, which bound them to supply gas of 14 sperm candles illuminating power. At half-past eight on that evening, however, the quality of the gas was found to be only equal to 13·59 candles, and at a quarter after nine o'clock it had fallen to 12·16 candles. Those were the simple facts up to the evening of the 15th of November, with regard to Mr. Moncreaff's actions; but it was necessary that he should point out that Mr. Ballard, an agent of the Company, was present at the testing, and took down upon a piece of paper the result at which Mr. Moncreaff had arrived while his eye was at the photometer. Mr. Ballard reckoned up with Mr. Moncreaff the numbers, and carried the result away with him, and thus the Company had a report of the testing which had taken place, and a report which could not be more satisfactory, it having been made by their own Inspector with respect to operations carried on in his very presence. The two Examiners perfectly agreed, and the matter was over for that day. He (Mr. Sleigh) took it that probably some point would be made, owing to the report not having been served on the Company on the day following the testing. But he urged that the defendants had a report; and, more than that, he said that even not having a report had nothing to do with the jurisdiction of the Court, and that it had nothing whatever to do with the section which gave the Magistrates power to impose a fine. Supposing it were a civil action, he said that, under the 33rd section, the report would be receivable either for or against the Company. But that section did not assist the Magistrates in any way. The Act of Parliament was divided into two separate portions. Beginning at the 28th section, there were provisions for the testing of the gas, and what the Gas Examiner should do for the Company, so that they might know that they had a proper report of the proceedings of testing, and after that there was a section which recited other stipulations. Then came sections referring to the jurisdiction of the Magistrates in the matters of penalty, and the 36th section said that, "if it should be proved to the satisfaction of two Justices, not being Shareholders in the undertaking, that the gas was of less illuminating power or of less purity than the undertakers had agreed upon, they (the undertakers) should pay to the Local Authority, or any other person so suing, any sum not exceeding £20, as such Justices should determine." That was the section which gave the Court jurisdiction. It did not say that the Justices should be satisfied that the Examiner had given a report on the following day, but that, if the gas were proved impure or deficient in illuminating power, the Company should be bound to pay the penalty to the Local Authority. There was proof that Mr. Moncreaff had found the illuminating power of the gas to be 13·59 candles at half-past eight, and 12·16 candles at a quarter after nine on the same evening, instead of 14 candles; and if the Magistrates were satisfied, and were clear upon that point, then the offence was made out and the penalty was compulsory. It was a matter of great importance that the question should be once and for all decided, and if he had not felt it was so, he should not have been justified in taking up their

time, believing that it might have a very beneficial effect upon the Company in the future, and might make them more careful in the performance of their duties. When they recollected that the Corporation had to pay a fixed sum per annum for the supply of gas to their street lights, amounting to many thousands of pounds, it was material to them and to the public that they should have value for their money, and that the proper quality of gas should be continued throughout the night. What was felt on the part of the Corporation was that the gas was under the 14 sperm candles standard, and that it varied in quality even during the hours at which the Examiner had liberty to test, those hours being limited, as he had already pointed out. It was, however, very important that the gas supplied after the stipulated hours, both in summer and winter, should be kept up to its proper standard, as then the streets were more deserted than earlier, the lamps being intended for the convenience and for the protection of the public peace and comfort. The Corporation also felt that, whether or not the illuminating power were kept up during the night, it was very unsatisfactory to find such vast differences as he had alluded to within an hour or two. They had been urged to take up the matter because they had noticed the varying lights in the streets, and from the fact that, both in the public lamps, and in the houses of private consumers, the gas went down in an unaccountable manner during those hours in which the Gas Inspector was not entitled to test.

Mr. Garrington: Is it the case that notice is to be given on all occasions of testing?

Mr. Sleigh: Yes, sir.

The Clerk: It means that notice is to be given in writing.

Mr. Sleigh said what he urged was that the report, which was receivable in evidence, did not affect the jurisdiction of the Magistrates. He might say at once that, if the Magistrates had any doubt upon that point, he should ask for a case to be granted for a Superior Court. The 33rd section said that the Company should have a report on the day following the testing, in order that there might be no delay; and he contended that the Company did have a written report, which was made between the Examiner and their own Inspector, the two reducing the results of the testing into figures. He thought it would be making the Act of Parliament an absurdity to say that the Company had not had any report. They had received all the information they required, for the report was simply the figures showing the quality of the gas; and this the Company had, the experiments being made in the presence of their own official, reduced into figures, and given to him.

The Clerk: But it says the day after the testing a report shall be given.

Mr. Sleigh thought that if the Company had received their report one day before they were entitled to it, they had nothing of which to complain. Acts of Parliament, even when relating to penal offences, were to be construed with their context and according to the English language, and they were not to be distorted for the purpose of supporting any quibble to relieve an offender from penalty. Therefore, as the context provided that the Company should have knowledge immediately after the results of the Examiner had been arrived at, was it not going beyond the Act to say that it was not sufficient, when a report of what had been done in the presence of the Company's own Inspector was delivered to him? If this particular point was to settle the case, he thought it would be better to determine at once, before going into facts, whether the Magistrates were of opinion that they had jurisdiction.

The Clerk said it was clear that the 33rd section was as to facts.

Mr. Ford said he probably should have a great deal to say about the matter.

Mr. Sleigh: It is a very inconvenient mode of suggestion; but I think I will wait until Mr. Ford raises technical points.

Mr. *Henry Moncreaff*, the Gas Examiner, was then called, and gave formal evidence of the deficiency in illuminating power, as mentioned in counsel's opening speech. He said that he and Mr. Ballard reckoned up the result of their testing, and as he gave it Mr. Ballard wrote the result down. He was fully aware of the mode of testing as laid down by the Act of Parliament, and the testing was taken strictly according to the rules, and no objection was made by Mr. Ballard as to the mode of testing, or as to the result arrived at. He could scarcely remember what Mr. Ballard said on the occasion, but he acknowledged that the illuminating power was down.

In cross-examination, witness said he had for the last seven years tested about four times every week, and had never received the slightest interruption from any of the Company's servants; but, on the contrary, he had been afforded every facility for the discharge of his duties. He had not laid any information against the Company before, never having received any instructions to do so. The gas had been under the standard about three or four times a quarter, and he had reported it on each following day to the Town Clerk. Since the 29th of November he had furnished a report to the Company, and he had done so in consequence of something which had passed between himself and the Company's Examiner, Mr. Ballard. He had been asked to allow his observations to be tested and had refused. Observations had been taken by the Company's agent on the 15th of November, after he had made his, and the figures differed. Mr. Ballard had told him that he had taken observations, and that the results were above his. He had taken a second observation on the 15th of November, because he saw the photometer was gradually going down. In his opinion, the difference between his and Mr. Ballard's observations was because the gas was coming from a separate holder at Rudmore, and that the gas was of two qualities. It took ten distinct observations of one minute each to get at a test. The photometer was a very nicely constructed instrument, and he did not know that two careful manipulators might come to different results.

In re-examination, witness said he had been acquainted with gas and meters ever since 1863.

Mr. Ford then addressed the Magistrate on behalf of the Company, who, he said, had been in existence ever since 1821, and had done a good deal to advance the interests of the inhabitants; but they now, for the first time in their extensive experience, appeared before the Justices for having committed an alleged breach of the law. He did not, however, consider that the Company had done anything very serious. They had gained a reputation for having attended to the wants of the inhabitants in an exceptional way, and, although he was not a Shareholder, he could say that the Company were prosperous, and had administered their affairs with prudence and caution. He was there to say that it had been the constant and unremitting study of his clients to meet the wants and necessary supplies of the public, while benefiting those who were Shareholders; but for what were they in Court that day? It had been said that after a career of many years, and being subject to the operation of very stringent Acts of Parliament, they in November last so offended the authorities of the borough that they were dragged into Court to answer all that was alleged against them. First of all he denied the accuracy of the evidence on the other side, and said that Mr. Moncreaff's figures were controverted by a man who was equally to be depended upon; and, beyond that, there had been kept back from the Magistrates facts which ought to have been given. Not only did he deny that the illuminating power of the gas was less than it ought to have been, but he also asserted that, under the Acts which governed matters of this kind, the Company had a right to say that, even if the gas was of less illuminating power than stated in the section, it was unavoidable. The first thing he inquired about was if there was any excuse for his clients, and he discovered that by the Act of 1861 there were privileges conferred upon the Company, and those privileges still existed. The 20th section of the Portsea Gas Act provided that, "unless by reason of frost, accident, unavoidable casualty, or deficiency of coals," the standard of the gas should be equal to twelve sperm candles." During the year 1872 it became necessary, for the internal interests of the Company, that a Provisional Order should be obtained, and in the month of June of that year an Order was passed which said that "it did not affect any previous Act," the only alteration being in the 15th section, which raised the standard of illuminating power from 12 to 14 candles. And it was expressly stated in the Confirmation Act that "no Company shall incur any penalty for non-illuminating power or for excessive impurity of gas where such shall be caused by unavoidable accident." He was not representing gentlemen who wished to get out of their obligations by any technical objections, but they were anxious to do their duty to the public and to their shareholders; and when they found Acts were passed for their protection, he asked the Magistrates to pay attention to those Acts. If he showed that the depreciation in illuminating power, granting for the moment that this was the case, was caused by accident, then he held that the Magistrates had nothing whatever to determine. In section 12 of the Act of 1872 it was laid down that "nothing in this Order shall in any way prejudice the powers or privileges of the original Act." The Company were bound, therefore, to supply 14-candle gas, and with this obligation they had almost invariably complied. It was plain to any man reading the Act that they were entitled to say their deficiency of illuminating power had been caused by accident. Then he came to another important part of the case. He should be sorry to think that Mr. Moncreaff would not receive his due meed of justice at his hands, for he admitted that he had good recommendations about him; but was he to come there and proclaim himself the infallible Examiner of Gas? It was very right that he should not be interrupted in his duties, but it was not provided that he was to go into the matter of examination solely and alone, the Act itself providing that another person might be present. Mr. Moncreaff, however, it was evident, presented himself there that day with a certain amount of bias. Numerous appliances had been brought to bear upon the question of gas, and, without going into details, they knew it was altogether differently manufactured now to what it was 20 years ago, and that they had scientific appliances and products from it now which were never thought of in the times of their forefathers; but, notwithstanding all that science had provided, the Examiner, in his experiments, had wholly to rely upon that sight with which Providence had blessed him for his results. It was well known what popular assemblies like the Town Council would have done had the Company compromised themselves by constantly providing a supply of gas deficient in illuminating power. They would doubtless have given instructions to prosecute to the full extent; but had he asked Mr. Moncreaff how many times the gas had been above the standard, they would probably not have got a correct reply. He ventured, however, to say that in 99 out of every 100 observations the standard of 14 candles had been exceeded. Human nature was always imperfect, and hardly to be relied upon; and, although the photometer was a very finely manufactured instrument, it was liable to mislead, requiring the nicest possible manipulation, any neglect of which necessarily led to mistakes. On the part of the Company, he utterly and distinctly denied Mr. Moncreaff's theory as to the two qualities of the gas; it being simply absurd, from the fact that there was but one source of supply from the holders and reservoirs to the town. He proposed, too, to show the Magistrates that on the day in question a test was made by the Company's own officer at 7.30, and at that time the illuminating power of the gas was 14·62 candles; and all this would be to some extent an answer, because it would show that the standard was above rather than below the figure imposed. His account of the gas being of less quality, supposing it to have been so after their own test was taken, was that it was wholly unavoidable. There were certain enemies with which gas makers had to contend, and which were ammonia, sulphuretted hydrogen, and carbonic acid; and what he was going to prove was that on each of the occasions to which the informations referred there was present a quantity of carbonic acid, reducing the illuminating power by one candle. The Company were under the impression, at that particular time, that they had provided sufficient plant for the expected demand upon them; but, in November, they were overtaken with a demand greater than they could meet, and had to resort to every possible means of manufacture. The increased demand which they had to meet was 4½ or 5 million feet of gas, and it put the Company to their wits ends. They sent to London for appliances to remove the cause of the deficient illuminating power, and they overcame the difficulty; but that there was a deficient supply they did not admit, although there might have been an excess of carbonic acid. The Company were now expending £10,000 to properly meet the wants of the public during the next winter. With regard to the serving of the written notice, he contended that it ought to have been done on the day succeeding the testing, and he also expressed his opinion that Mr. Moncreaff was liable to an indictment for having failed to do so. In conclusion, he said that this was a case which had given rise to a great deal of discussion in the town, but when the Town Council found that deficiencies were so few, he should have thought that the Committee would have been glad to have listened to any explanation which the Company had to offer. One-fourth of the members of the Town Council being Shareholders in the Gas Company, their lips were, of course, sealed; but he hoped, even then, at the last moment, his learned friend on the other side would see his way clear to withdraw, and thus say that the Company had done all they could, that they were willing to take a conscientious view of their duties, and that the deficiency must never happen again.

Mr. Sleigh said that, after consulting with the Town Clerk, they were anxious to do what was right in this matter. If he might take it from Mr. Ford that the deficiency was due to some unaccountable accident, and that in future more care would be taken to supply the public wants, then he believed it would be satisfactory, and he would be prepared to take the course suggested.

Mr. Ford: We admit that there was a deficiency in the quality, and we promise that for the future more care will be taken in regard to the supply.

Mr. Sleigh said, that being so, he would withdraw the whole of the informations. The Company would probably feel that they had a duty to perform to the public, and that they, as far as possible, would take care that no accident should prevent the town being properly supplied with gas in return for the great privileges which they enjoyed.

The summons for the date in question, and three others, were then withdrawn.

LAMBETH POLICE COURT.—Monday, March 11.

(*Before Mr.* Ellison.)

ILLEGAL CONSUMPTION OF GAS.

Ernest Therry, 2, Union Road, Clapham Road, appeared to an adjourned summons, taken out by the Phœnix Gas Company, for having, on or about the 5th ult., unlawfully and improperly used and burned gas belonging to the Company, without giving notice.

The summons was originally against a Mrs. Pouboif, for illegally connecting the gas after it had been cut off. This summons was adjourned, as Marie Pouboif did not appear; and it being stated that the present defendant was the occupier, proceedings were taken against him. Evidence was now given showing that, after the gas had been cut off, it was found to be burning at the house from the 6th to the 8th of February. On the 9th of February the defendant came to the office of the Company, and admitted that he was the occupier, and asked to be supplied with gas.

The defendant, through an interpreter, contended that he was not the party who really burned the gas, and called a witness, who stated that a meeting of a "French Company" was held at the house on the days mentioned in the summons, and the gas burned on account of such meeting. The witness, however, in cross-examination, admitted that the defendant was a member of the French Company, and must have known the gas was being consumed.

Mr. ALLEN, who appeared for the Gas Company, said, in answer to the Magistrate, there was no desire to press for the heavy penalties defendant had rendered himself liable to under the Act.

Mr. ELLISON said it was, no doubt, a most important matter for the Gas Company. The defendant had said he was not the occupier; but it had been shown that he had gone to the Company's office, and declared he was the occupier, and had even paid the amount due. It was quite clear he was the occupier, and a member of the French Company, whose meetings were held at the house at the time the gas was consumed. It might have been a matter of neglect; and as the Gas Company did not wish to press the case, he should only order the defendant to pay a penalty of 20s., together with full costs.

WANDSWORTH POLICE COURT.—WEDNESDAY, MARCH 13.
(*Before Mr.* PAGET.)

THE INCONVENIENCE OF PARTNERSHIP ARRANGEMENTS IN WATER SUPPLY.

The occupier of a house at Wimbledon attended to complain of the Southwark and Vauxhall Water-Works Company cutting off his supply. He said he had made three applications to the Company, but he could not obtain any reply. He did not owe the Company any money, but his next-door neighbour had refused to pay an alleged overcharge. There was one supply for the two houses into a tank which stood on his (the applicant's) premises.

Mr. PAGET inquired whether the applicant had tendered the whole amount for the two houses.

The applicant said he had not.

Mr. PAGET told him he must do so before he would be entitled to a supply of water.

Another man living in Battersea also attended to complain of the Company cutting off his supply under similar circumstances.

Mr. PAGET said the applicant must tender the money for the present quarter, as the Company were not bound to trust him. If the Company refused to supply the applicant after he had tendered the money, he could apply to him again.

MOLD GAS AND WATER COMPANY.—At the half-yearly meeting of the above Company, held recently, the report of the Directors to the Shareholders was adopted. The balance-sheet showed a net profit available for dividend for the year of £931. A dividend of 7 per cent. was declared on the year, the remainder going to the contingent-fund for renewal of mains, &c. The two Directors whose term of office expired were re-elected, and it was determined to lay larger mains through the town, those now in the ground having been in for many years, and being too small. The usual votes of thanks closed the meeting.

GAS EXPLOSION AT RICHMOND (YORKS).—The inhabitants of the west end of Richmond were much alarmed, on the morning of the 19th inst., by a couple of loud reports, resembling the sound of a cannon. The inmates of the workhouse were almost suffocated with a strong smell of gas, and for some considerable time they were unable to discover the place of escape. Eventually one of the male inmates happened to try, with some lighted paper, a large sanitary pipe, a portion of which is open in the yard adjoining the vagrants ward, when there were two loud explosions. The workhouse was shaken from its foundation, and several of the walls were cracked and thrown out of order. Outside the workhouse the terrace was blown up for a distance of 30 yards, and there were eruptions of earth at different places along the sewer—into which there had undoubtedly been an escape from the gas-main—for perhaps 60 or 70 yards. Fortunately no person was injured, though the man who caused the explosion had a narrow escape.—*Northern Echo.*

ASHTON-IN-MAKERFIELD GAS-WORKS.—Mr. J. E. Fairless, the Clerk and Gas-Works Manager to the Local Board of Ashton, in his report for the quarter ending Dec. 31 last, says: "The manufacture of gas at your works during this and the corresponding quarter of last year was as follows:—

Quarter ending	Total Quantity of Gas manufactured in Feet.	Weight of Coals used in Tons.	Average No. of Feet per Ton.
Dec. 31, 1876 . . .	1,346,000	164	8,200
Dec. 31, 1877 . . .	1,407,000	150	9,400
Increase in 1877 . .	61,000	—	1,200
Decrease in 1877 . .	—	14	—

Taking the 150 tons of coal used, these figures show a total gain of 180,000 feet from the same quantity of coal as compared with last year. I may also remark here, that the above statement shows a gain of 2000 feet per ton as compared with 1875, when there were nothing but iron retorts in use. I believe that these very satisfactory results are principally to be attributed to the entire renewal of the retorts during the summer, the whole of which work was very carefully done by your own workmen during the intervals when they were not employed in charging or otherwise in the making of gas. The following figures will show how the above has been distributed, and also the quantity of gas unaccounted for in leakages, &c., as compared with the same quarter of last year:—

How Distributed.	1876.	1877.
Sold to private consumers . . .	1,022,600	1,149,800
Supplied to public lamps . . .	194,500	182,300
Consumed on works	15,000	15,000
	1,232,100	1,347,100
Unaccounted for	113,900	159,000
	1,346,000	1,407,000

The per centage of leakage in 1876 was 9, and in 1877, 11¼. The slight increase, I think, may be fully accounted for by the subsidence near Pewfall Colliery. Considering that you have a great length of mains, nearly five miles, and a very small proportionate consumption, I think these figures speak well for the soundness of your mains, as the per centage is considerably under the average."

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.—At the meeting of the Board on Friday last a letter was read from the Board of Trade, stating, in reply to the Board's letter, that they are not prepared to deal with the subject of the proposed amendment of the penalty clauses in the Acts of The Gaslight and Coke Company and the Commercial and South Metropolitan Gas Companies during the present session.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone, and supplied by The Gaslight and Coke Company, during February:—

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon.in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Gas supplied from the Fulham works . .	16·61	17·60	15·94	20·45	9·61	20·75	0·55	No trace
Gas supplied from the Beckton and Bow works	16·54	17·31	16·11	35·10	18·72	12·75	0·45	No trace
Cannel gas supplied from the Pimlico works	20·82	22·10	19·56	21·02	12·19	16·85	0·50	No trace

Mean of daily readings of barometer. . . . 30·02
" " " thermometer . . . 57·63

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the gas supplied from the Fulham works was equal to rather more than 16½ candles; it ranged between 15·94 and 17·60 candles. Twice it exceeded 17 candles. The mean amount of sulphur in 100 cubic feet of this gas was rather over 20 grains, and of ammonia half a grain. The mean light from the Beckton and Bow gas was equal to 16½ candles; on no occasion was it below the standard, and twice it exceeded 17 candles. The mean amount of sulphur found was less than 13 grains, and of ammonia rather less than half a grain. The mean light from the cannel gas was equal to nearly 21 candles; it ranged between 19·56 and 22·1 candles; three times it exceeded 22 candles, and five times 21 candles. The mean amount of sulphur was under 17 grains, and of ammonia half a grain. The pressure of all the gases was satisfactory, and on no occasion was sulphuretted hydrogen detected by the ordinary tests.

METROPOLIS WATER SUPPLY.

WHITECHAPEL DISTRICT BOARD.—At their meeting, on the 19th inst., it was resolved, on consideration of a report from their Works Committee—"That, in the opinion of this Board, the cost of the supply of water in the Metropolis, under the existing arrangements of the Water Companies, has become oppressive to the ratepayers, and threatens to become still more so, and that it is both important and desirable that the business of the water supply of the Metropolis should be exercised by a representative body, with power to acquire the interests of the existing Water Companies at the expense of the ratepayers. That the Metropolitan Board is, in the opinion of this Board, a body so constituted, and, if sufficiently increased in number before being invested with powers to undertake so large an accession of responsibility and duty, would be the proper body to undertake such duties, but, with the present limited number of that Board, such duties cannot, in the opinion of this Board, be effectually performed."

Major Bolton reports that the state of the water in the Thames and Lea was generally turbid and discoloured during the month of February. In the Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated), the water was turbid from the 1st to the 7th of February, it improved in clearness on the 8th, and from that date it remained fairly good up to the 15th, after which it again became discoloured, and remained in a turbid condition until the 19th, when it fined down and remained good for the rest of the month. The highest flood state of the river at Hampton during the month was 2 feet 5 inches above summer level, and the lowest reached the summer level. At Molesey the highest temperature of the water was 47°, and the lowest 37°, and the highest temperature of the air was 50°, and the lowest 30°; these observations were taken daily at 9 a.m. The rainfall at Molesey was 0·99 inches.

Dr. Whitmore's report on the composition of Thames Companies and other waters supplied to Marylebone during February:—

	In Grains, per Gallon.			In Parts, per Million.		In Degrees.	
	Total Solid Matter.	Loss by Incineration.*	Chlorine.	Free Ammonia.	Albumenoid Ammonia.	Hardness.	Hardness after boiling Fifteen Minutes.
West Middlesex	21·60	0·90	1·16	0·01	0·07	14·8	3·4
Grand Junction	21·64	0·95	1·18	0·0.	0·08	14·9	3·4

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water. The total solid matter, *minus* such loss, consisted chiefly of carbonate of lime, with small quantities of other equally harmless salts.

The water of both Companies, when drawn from the mains, as seen through a stratum of two feet in depth, was perfectly clear and colourless. The water taken from the Thames at Hampton was somewhat turbid.

PROPOSED TRANSFER OF THE LOWER GORNAL GAS-WORKS.—A meeting of the Upper Sedgley Local Board was held on the 12th inst., when the Gas Committee, appointed to advise the Board as to the expediency of purchasing the gas-works at Lower Gornal, for the purpose of supplying the district with gas, reported, as the result of their inquiries and conferences, that the Company had signified their willingness to sell the works for £3250, and that the present lessee would give up the lease on compensation being made to him for the unexpired term of five years. The Committee, after explaining the position of the matter, recommended the purchase, provided the works could be secured for £3000. Upon a motion to accept the recommendation and make the purchase, a discussion ensued, terminating in the matter being postponed until after the election of the new members of the Board.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Thursday, the 21st inst., at the Albion Tavern, Aldersgate Street—ERASMUS WILSON, Esq., F.R.S., in the chair.

The following are the report and statement of accounts:—

The Directors report that the general working of the Company during the half year has been satisfactory.

Contracts have been made for coal at a lower rate.

The Directors consider that they are in a position to make a further reduction in the price of gas—viz., to 3s. 10d., per 1000 cubic feet to the general consumer; such reduction will take place from and after Lady-day quarter.

Considerable additions to, and improvements in, the works and plant have been made during the half year.

The Directors have purchased a large plot of freehold land adjoining the present works, available for future extensions.

The Directors going out of office by rotation are Mr. Frederick L. Linging and Mr. C. Lea Wilson, who, being eligible, offer themselves for re-election.

The Auditor going out of office by rotation is Mr. James Glaisher, who, being eligible, offers himself for re-election.

The reports, of the Gas Examiners of the parishes supplied by the Company, on the illuminating power of the gas, and its freedom from sulphuretted hydrogen and ammonia, continue to be satisfactory.

In accordance with the resolution of the extraordinary general meeting, held on the 20th of September last, the 25,000 new ordinary 7 per cent. shares of £6 each were allotted *pro ratâ* among the Stockholders. Of the total number so offered, 1031 were unclaimed or declined; these latter shares were again offered to the Stockholders in the proportion of one share for every £250 of stock held, and one share to all Stockholders holding less than £250 of stock; there now remain, however, 129 which have been a second time not accepted, and these are left for the Proprietors to deal with.

The accounts annexed show the financial position of the Company. The balance of profit and loss account amounts to £10,012 7s. Out of this sum the Directors recommend the declaration of a dividend for the half year ending the 31st of December last as follows, viz.:—At the rate of 6 per cent. per annum on the preference stock; at the rate of 7 per cent. per annum on the ordinary 7 per cent. stock; at the rate of 10 per cent. per annnm on the ordinary 10 per cent. stock; and at the rate of 7 per cent. per annum on the new ordinary 7 per cent. shares; all less income-tax. This will absorb £9669 15s. 10d., and leave £342 11s. 2d. to be carried forward to the profit of the succeeding half year.

REVENUE ACCOUNT, *for the Half Year ended Dec.* 31, 1877.

Dr.				Cr.		
To Manufacture of gas—				**By Sale of gas—**		
1. Coals, including all expenses	£19,824 1 7			Michaelmas quarter—		
2. Purifying materials, wages, &c.	915 4 11			1. Private rental—		
3. Salaries of Engineer and officers	461 7 4			2,025,500 cubic feet, at 3s. 7d.	£362 18 0	
4. Wages and gratuities	3,284 6 3			1,390,100 ,, 3s. 9d.	260 12 18	
5. Works, machines, and retorts—Maintenance of, repairs, and labour	4,871 13 11			1,255,300 ,, 3s. 10d.	240 12 0	
		£29,356 14 0		50,767,900 ,, 3s. 11d.	9,942 1 0	
Distribution of gas—				2. Public rental and under contracts	1,779 7 11	
6. Salaries of Chief Inspector, Inspectors, and Clerks in Light Office	£725 17 0					£12,585 11 10
7. Mains and service-pipes, repairs, maintenance, renewal, and labour	719 9 1			Christmas quarter—		
8. Meters, gas-stoves, and regulators, repairing and renewing, &c.	1,150 18 11			3. Private rental—		
		2,596 5 0		2,768,900 cubic feet, at 3s. 7d.	£496 2 0	
Public lamps—				2,266,200 ,, 3s. 9d.	424 18 3	
9. Lighting and repairing		622 5 0		1,107,300 ,, 3s. 10d.	212 4 9	
Rents, rates, and taxes—				113,119,700 ,, 3s. 11d.	22,152 12 0	
10. Rents	£14 9 6			4. Public rental and under contracts	1,780 17 9	
11. Rates and taxes	1,638 7 11					25,066 14 9
		1,652 17 5		Gas-rental		£37,652 6 7
Management—				5. Meter-rental—the half year		630 6 2
12. Directors allowances	£750 0 0			Total rental		£38,282 12 9
13. Salaries of Secretary, Accountant, Clerks, and Messenger	555 18 2			**Residual products—**		
14. Collectors commission	413 9 0			6. Coke, less labour and cartage	£7,867 0 10	
15. Stationery and printing	238 13 7			7. Breeze ,, ,,	187 15 0	
16. General establishment charges	342 4 5			8. Tar	1,214 7 0	
17. Auditors—June £15 0 0				9. Sundries	9 8 1	
December 30 0 0						9,278 10 11
	45 0 0			10. Sulphate and ammoniacal liquor, less labour, &c.		1,815 0 8
		2,345 5 2				
Sundries—						
18. Law and parliamentary charges		969 11 11				
19. Bad debts		215 11 4				
20. Insurance-fund		198 10 6				
Total expenditure		£37,957 0 4		Total receipts		£49,376 4 4
Balance carried to profit and loss account		11,419 4 0				
		£49,376 4 4				

PROFIT AND LOSS ACCOUNT (NET REVENUE).

1. To Reserved fund account, amount carried from the half year's profits	£1,800 0 0		1. By Balance of net profit from last account	£9,741 12 6	
2. Balance of net profit to be carried to next account, subject to half year's dividends to the 31st of December	10,012 7 0		Less dividend paid for the half year ended the 30th of June	9,504 13 9	
					£236 18 9
			2. Balance from revenue account, being profit for the half year		11,419 4 0
			3. Interest on contingent-fund, &c.		156 4 3
	£11,812 7 0				£11,812 7 0

The CHAIRMAN, in moving the first resolution, said the report was a contrivance which seemed intended, and very justly so, to relieve Shareholders from the inconvenience of a long speech from their Chairman, inasmuch as it stated briefly and succinctly, in a carefully arranged manner, the history of the Company during the past six months. It, however, was always pleasant to meet the Shareholders on an occasion like the present, because they met as friends, and also as having trust in one another. The working of the Company during the past half year had been satisfactory. The Directors had again to state that coal had remained at a lower rate than it was, during the coal famine at any rate, and that contracts had been made of a satisfactory character. The report also referred to the reduction in the price of gas. The Directors had always been accustomed to reduce the price of gas, but for a time were prevented doing so in consequence of a variety of circumstances, particularly the coal famine; but now they had returned to the old and very satisfactory action of reducing the charge for gas consumed, so that it was brought to the general consumers at 3s. 10d. per 1000 feet. The Shareholders were also informed that considerable improvements had been made in the works and plant, and that the Directors had taken steps to provide for the expectations which they entertained as to the progress of the Company, and also for those needs which were inevitable in consequence of the gradual and progressive increase of the Company's business. Finding that the land which they occupied was getting too small for the amount of expansion which they believed the Company would require, they had added a portion of freehold land immediately adjoining their own property, so as to enable them, and those who followed them, to carry on any increase of building and plant likely to be required for a considerable number of years to come. Not only were they doing their duty to their consumers, but they were also doing their duty to Parliament, and to the Government, by looking very sharply indeed after the chemical constitution and purity of the gas. This involved a matter of considerable difficulty, and considerable chemical delicacy, and they were bound to admit that it was one of the troubles against which they had to contend—viz., the necessity of reducing the sulphur constituents of gas to the minimum required by their Act of Parliament. As he had stated previously, that amount of reduction was not by any means necessary, either so far as the illuminating power of the gas was concerned, or the health of the population who consumed it; it was done to satisfy a scientific fancy on the part of their legislators, that a moderate, almost impossible, minimum should be required. At the last meeting he stated that this led to a good deal of inconvenience, especially to those who lived in the immediate neighbourhood of works, because the greater part of the disagreeable and annoying smells which might possibly proceed from gas manufacture were occasioned by the necessity which they were under of removing from it products which were not by any means objectionable, but really would be, and were, beneficial to the public health. However, for the present they must remain content with the state of legislation in this matter, trusting that good sense and time would relieve them from the difficulty. With regard to the distribution of the new ordinary 7 per cent. shares, the report stated that a small number still remained on hand; there were many who were eager to possess them, but the difficulty was to divide them equitably amongst the Shareholders. There were only 129 shares remaining. There were a good number of Shareholders who might be entitled to one share each, and, therefore, a proposal would be made for the purpose of settling that matter in a mode more convenient than that of distributing so small a number amongst such a large constituency as they now possessed. The last sweet morsel of the report stated the financial condition of the Company, and the amount of dividend that fell to each of the Shareholders. Those were the general points, and, without further comment, he should move—"That the report of the Directors, and the balance-sheet confirmed by the Auditors, be received, adopted, and entered upon the minutes."

The DEPUTY-CHAIRMAN (Mr. H. P. Stephenson) seconded the resolution, which was unanimously agreed to.

Mr. BENGOUGH said in order to get rid of the difficulty mentioned by the Chairman, he would move that the 129 remaining shares be given to the Directors, to divide as they thought fit among themselves and the officers of the Company. The Shareholders thought a good deal of their officers, and were always in the habit of passing a vote of thanks to them. There was not much solid food in this, and he thought that if the Directors could see their way, in any manner, to reward their officers with a few shares, the Shareholders would be perfectly agreeable to have such a course adopted.

Mr. POCOCK said he had much pleasure in seconding the resolution, and referred to the restrictions placed upon them by Act of Parliament with regard to the purity of the gas, and urged that, so far from improving, it was deteriorated. When Parliament opened their eyes to this fact, no doubt the Directors would be released from the trammels under which they were placed.

The resolution was unanimously agreed to.

The DEPUTY-CHAIRMAN moved—"That the dividend for the half year ending Dec. 31 last be now declared, and be made payable forthwith at the following rates per annum—viz., 6 per cent. on the preference stock; 7 per cent. on the ordinary 7 per cent. stock; 10 per cent. on the ordinary 10 per cent. stock; and 7 per cent. on the new ordinary 7 per cent. shares."

Mr. LINGING seconded the resolution, which was carried unanimously.

Mr. GEORGE LIVESEY moved—"That Mr. F. L. Linging, an outgoing Director of this Company, be re-elected a Director of the Company." He said it would be very unbecoming to say anything in Mr. Linging's praise in his presence; however, the Shareholders knew they could not possibly have a better Director than Mr. Linging, and he therefore had great pleasure in proposing his re-election.

The resolution was seconded, and agreed to.

Mr. NEWTON proposed the re-election of Mr. C. Lea Wilson as a Director, and said he was sure that to mention his name was quite sufficient to secure a unanimous re-election.

Mr. CURTIS seconded the resolution, which was agreed to.

On the motion of Mr. BENNETT, Mr. J. Glaisher was re-elected an Auditor of the Company.

Mr. R. H. JONES moved—"That the thanks of this meeting be given to the Directors of the Company for their able management of the affairs of the Company." Many of the Directors, he said, were personally known to him, and he felt satisfied that they could not possibly have a better set of men to sit round that board.

The resolution was seconded and agreed to.

The CHAIRMAN, in responding, said the Directors were very grateful for the kind manner in which the resolution had been received, and he might state, on their behalf, that what they had done hitherto was only a sample of that which it was their intention to do as long as they remained Directors of the Company. With regard to Mr. Pocock's observation, it was perfectly true that there was nothing in nature perfectly pure, and if it were so, it would be unfitted for the uses of life to man. As to the day coming when Parliament would open their eyes, he was sure it was a day they would not see. His experience of society amounted to this, that even Mr. Gladstone had a glimpse of the truth when he said—most uncomfortably and undesirably—that agitation was the only way in which it was possible to obtain anything in this favoured country; and it was only by pointing out, as they did from year to year, the unfairness of the proceedings forced upon them by Committees of the Houses of Parliament, that they could hope for their removal. They must do so. They must not call together their thousands under the tree of liberty in Hyde Park, but they might quietly, amongst themselves, say, "This is very wrong, and we shall do our best to remove it." That gentle kind of social agitation, without interfering with the happiness of society, would, no doubt, end in the attainment of that which they desired. He thanked them most heartily for their vote of thanks; and had now the pleasant duty to perform of moving a vote of thanks to the Auditors and officers of the Company. It was hardly necessary to repeat how essential these institutions were to the existence of the Company—their Auditors, who diligently and carefully examined their figures and accounts, and their officers, who equally diligently and carefully looked after the working interests of the Company. This was a resolution which would be accepted by all present. There was not even a spot upon that sun that enlightened their Company which could throw the slightest shadow upon their Auditors or officers.

Mr. LINGING seconded the resolution, which was unanimously adopted.

Mr. LAYTON, one of the Auditors, responded, and in doing so assured the Shareholders that their thanks were eminently due to the officers of the Company for the admirable and straightforward manner in which the books were kept. It was difficult to conceive how a set of books could be kept in a better way. He hoped, in time to come, they would be equally transparent, and that the thanks of the Shareholders might be continually due, not only to the Auditors, but also to the officers who so richly deserved them on the present occasion.

A vote of thanks to the Chairman brought the proceedings to an end.

ROCKHAMPTON (QUEENSLAND) GAS COMPANY.

The Half-Yearly General Meeting of Shareholders was held in the Council Chambers, Rockhampton, on Thursday, Dec. 20, 1877—Mr. H. JONES, the Chairman of the Company, presiding.

The SECRETARY read the report of the Directors, which was as follows:—

Your Directors have the pleasure of presenting their tenth half-yearly report, and furnishing to the Shareholders a statement of the Company's affairs.

The business of the past six months will allow the usual dividend, which the Directors recommend to be declared at the rate of 10 per cent. per annum, leaving £162 19s. 9d. to be carried to the reserve-fund.

It is often said that the success and progress of a Gas Company is a fair index of the state of trade and prosperity in a town, and here in Rockhampton, where the dulness is severely felt, owing to the long continued drought, the Directors congratulate you that the Company have maintained their ground in the face of difficulties and drawbacks, and that for the most part the gas bills are regularly and promptly paid.

The loss of the Company arising from the disastrous voyage of the bark *Rockhampton* is not fully ascertained, for although the goods were insured, the delay and detention has caused a loss of fully six months use of the new mains, and a further loss is occasioned by replacing the pipes thrown overboard, in addition also to the serious hindrance in erecting new retorts, and loss of interest on unremunerative capital.

Several interesting communications have been received from England, America, and New Zealand respecting the use of gas for cooking purposes, and the Directors are carefully watching for suitable opportunities to bring the best and most economical apparatus for cooking by gas before the Rockhampton public.

Since the report was prepared, the Directors sincerely regret to announce the demise of your respected Engineer, Mr. William Smith, whose death took place on Monday, the 17th of December. Arrangements are in progress for a suitable person to take charge of the works.

Dr. *Profit and Loss Account, for the Half Year ending Nov.* 30, 1877. Cr.

Manufacture, distribution of gas, and management	£940	2 4	Balance, May 31	£846	0 10
Discounts on gas-rents	101	10 3	Sales of gas, coke, and tar	2001	8 3
Bad debts written off	17	12 0	Scrip and transfers	1	18 0
Dividend, June 30	635	7 11	Rent of dwelling-house	22	10 0
Reserve-fund	210	12 10			
Wear and tear and depreciation	150	0 0			
Profit this half year	816	11 8			
	£2871	17 1		£2871	17 1

Liabilities and Assets.

Capital	£15,000	0 0	Fixed investment	£12,943	15 1
Less due and not called up	1,875	6 0	Floating ditto, coal, coke, and tar	440	14 10
	£13,124	14 0	Sundry debtors	385	7 4
Unclaimed dividends	16	16 8	A. J. S. Bank	415	13 1
Reserve-fund, Nov. 30	17	3 4	Cash in hand	0	8 3
Ditto, May 31	210	12 11			
Profit and loss	816	11 8			
	£14,185	18 7		£14,185	18 7

The CHAIRMAN, in moving the adoption of the report, remarked that the Company were progressing steadily, and he hoped by next meeting to report the extension of works. Of the material consigned in the barque *Rockhampton*, some 70 tons had been landed in very fair order; the remainder, thrown overboard on the voyage out, was covered by insurance, so that little loss would be sustained. The Directors had secured the services of an Engineer (Mr. W. A. Stephen), in the room of Mr. W. Smith, their late Engineer, whose death was a matter of deep regret. From all accounts Mr. Stephen was a most suitable gentleman for the position.

Mr. LIVERMORE inquired what discounts were allowed to consumers.

The CHAIRMAN stated that 5 per cent. discount was allowed on monthly accounts under 10,000 feet, and 7½ per cent. on those over that quantity. The discounts showed a little over 5 per cent. on the gas sales, evidencing prompt payments on the part of consumers.

The motion for the adoption of the report was agreed to and the proceedings terminated.

COLLINGWOOD, FITZROY, AND DISTRICT (AUSTRALIA) GAS AND COKE COMPANY.

The Ordinary General Meeting of this Company was held on Wednesday, the 30th of January last, when the following report and accounts were submitted:—

In presenting this, their last report, to the Shareholders, the Directors offer their congratulations on the amalgamation of the three Gas Companies, the Bill for which received the Royal Assent on the 20th day of December last.

The increased value of the shares, and the prospect of business based on the conditions of the new Act of Parliament, will allay any apprehension that may have been entertained as to the desirableness of amalgamation by any Shareholder of this Company.

The interest of the Shareholders is now transferred to the Metropolitan Gas Company, and for every four shares held in this Company, seven shares will be issued by the Metropolitan Company, and instead of single share scrip, they will be put in such lots as may be required, on giving up the scrip now held.

It is intended as soon as possible to unite the business in one office.

The services of Mr. Scott (formerly Secretary to the City of Melbourne Company) have been retained as Secretary of the new Company, whilst Mr. Vasey (formerly Secretary of this Company) remains as Office Manager.

The works of the three Companies are being put into thorough repair, to meet the demands for winter. The Collingwood Company's works (henceforth to be called "Fitzroy Station") have been handed over in excellent order and condition, reflecting great credit on Mr. Wier, the Company's Engineer.

The accounts now presented show favourably with gas at 7s. 6d. per 1000. Whilst this price is charged to the public, the maximum rate of dividend to be paid will be 10 per cent.; for every reduction of 5d. per 1000 feet during the next five years, the rate of dividend may be increased by 1 per cent.

A dividend at the rate of 8s. per share is now recommended.

Dr. *Balance-Sheet, Dec.* 31, 1877. Cr.

Paid-up capital	£100,000	0 0	Land, works, apparatus, services, meters, &c.	£232,309	15 4
Debenture bonds	50,000	0 0	Material in store	1,072	18 3
Interest on debenture bonds	577	10 0	Coal in store	2,460	8 1
Sundry amounts owing by the Company	3,674	2 11	Lime in store	25	0 0
Wear and tear account	9,560	13 10	Coke in store	52	10 0
Bills payable	9,499	3 10	Tar in store	71	16 3
Reserve-fund account	33,000	0 0	Sundry amounts owing for gas	8,422	8 10
Insurance-fund account	1,500	0 0	Sundry amounts owing for coke	1,112	5 1
Contingent-fund account	970	3 5	Balance in bank	404	13 6
Dividends and bonuses unclaimed	45	11 0	Metropolitan Gas Company	1,403	5 2
Services and meters replacement account	30,311	13 1	Cash in hand	648	11 11
Profit and loss	8,849	13 1	Amounts owing to the Company	4	18 0
	£247,988	10 5		£247,988	10 5

Profit and Loss Account for the Half Year ending Dec. 31, 1877.

Coal carbonized	£16,547	0 3	Gas-rates	£33,116	8 6
Lime used for purifying	547	0 0	Coke sold	4,350	10 8
General charges—			Tar sold	1,032	18 7
Allowance to Directors	300	0 0	Ammoniacal liquor sold	172	10 4
Allowance to Directors for services on Committee re-amalgamation	192	3 0	Sales of sundry materials	106	4 9
Auditors fees	15	15 0	Transfer fees	6	5 0
Officers salaries	1,887	8 10			
Rent of offices	200	0 0			
Rates and taxes	309	1 8			
Law charges	729	18 5			
Printing and stationery	86	3 7			
Advertising	21	12 2			
Wages—Storeman	88	16 8			
Stokers	2,298	15 0			
Labourers	951	14 9			
Inspectors	824	17 0			
Repairs	273	14 3			
Lamplighting	203	13 9			
Materials used	603	10 9			
Cartages	417	3 2			
Subscriptions to charities	45	3 0			
Miscellaneous	353	9 4			
Interest on debentures	1,305	0 0			
Commission and interest	369	5 9			
Bad debts and contingencies	1,421	19 0			
Wear and tear	745	13 9			
Balance	8,045	16 9			
	£38,784	17 10		£38,784	17 10
			Balance at credit of profit and loss, June 30, 1877	£5,803	15 7
			Less amount to pay dividend declared July 20, 1877	5,000	0 0
				£803	15 7
			Balance brought down	8,045	16 9
				£8,849	12 4

The following interesting particulars concerning the manufacture of gas at the Company's works during the second half of last year has been prepared by Mr. J. Weir, the Engineer, under whose able superintendence the Fitzroy station of the Amalgamated Company has been placed:—

Particulars in the Manufacture of Gas at the Collingwood, Fitzroy, and District Gas Company's Works for the Half Year ending Dec. 31, 1877.

Coals used	9,239 tons.
Shale used	522 „
Total	9,761 tons.
Gas registered through station-meter	101,776,000 cubic feet.
Do. through consumers meters	87,182,000 „
Tar made	113,807 gallons.
Ammonia water made	197,772 „
Since used	10,970 bushels.

Average barometer, 30·04; average thermometer, outside, 55°; gas, 72°.
Gas leaves the works through 18-in., 15-in., 12-in., 12-in., and 12-in. pipes.
Pressure, evening consumption, 40-10ths; other times, average, 15-10ths.

Length of cast-iron mains in use (2½ in. to 18 in.)	120 miles.
Do. wrought-iron service-mains (1¼ in to 2 in.)	40 „
Total	160 miles.

In the above production of gas there is no allowance made for loss in main and service laying, nor for gas used at works, &c.

The reason that so high a pressure is used is in consequence of the distance the gas is sent, and that a large portion is forced over a rise of 90 feet above the works to 50 feet below the level of the works, and the rapid extension of mains and services, which has outgrown the present means of distribution.

There are about 15,000 meters in use.

Average production per ton of coal	10,427 cubic feet.
Leakage and condensation	12·3 per cent.
Retorts used (15 in. and 16 in.), 18 feet long, through and through.	

(Signed) J. WIER.

LIVERPOOL WATER SUPPLY.—From a report submitted by the Engineer to the Liverpool Corporation as to the state of the works at Rivington and the wells, it appeared that the total supply from the wells during the past year had been 1,439,157,622 gallons, and the average supply per day 3,953,728 gallons. The pumping-stations were generally in good order. The supply to Liverpool during the year had been without exception constant. The average supply per head per day for all purposes had been 22·83 gallons. This included 4·74 gallons per head per day charged by meter for trade purposes, and about 3 gallons per head per day for public purposes, and for trades charged by assessment, leaving 15 gallons per head per day as the consumption for domestic purposes, hotels, public-houses, warehouses, offices, and shops.

ILKESTON GAS SUPPLY.

Local Government Board Inquiry.

On Friday, the 8th inst., Mr. R. Morgan, C.E., conducted an inquiry at the Town Hall, Ilkeston, upon an application made by the Ilkeston Local Board to the Local Government Board for a Provisional Order to empower them to take a transfer of the works and undertaking of the Ilkeston Gas Company.

Mr. Leech, Solicitor to the Local Board, opened the case. He said the Gas Company were formed in the year 1848, when Ilkeston was a very small place, and the Company were equally small. They started with a capital of £2000, which was afterwards increased by £500. In the year 1864 the Local Board were formed, and from that time up to 1876 there were many complaints as to the mode in which the gas was supplied to the town. The Board erected public lamps, and made all necessary arrangements, but frequently the Company showed themselves unequal to meeting the requirements of a progressing district like Ilkeston. Not only were there grievances as to the defective nature of the gas, with respect to its want of purity and illuminating power, but in many instances the Company did not feel it to be worth their while to supply gas at all. They were making large profits; these they divided to some extent, but there were many things done which, instead of being paid for out of capital, were met out of the profits. As he had said, the Company did not care to supply small consumers, and this fact, coupled with the quality of the gas, created great dissatisfaction, which culminated in 1876 in a memorial from the gas consumers to the Local Board, praying the latter to take over the works of the Company, under powers to be obtained for that purpose. That, he might say, was a spontaneous act on the part of the consumers, not being fomented or encouraged by the Board in any way. On the 29th of December, 1876, a public meeting, which was largely attended by the ratepayers, was held in the Town Hall, and the expression of opinion then was almost unanimous that it would be advisable to carry out the prayer of the memorial. A poll was demanded, which took place on the 22nd of January, 1877, the result being that 1497 persons voted for the taking over of the works, and 261 against, there being thus a majority of 1236 in favour of the movement. After the meeting, negotiations were opened between the Company and some members of the Local Board, for the purpose of taking over the undertaking of the Company, and an understanding was arrived at, which, however, was not ratified by the Shareholders of the Company. The understanding was that the Local Board should take over the works at £12 per share, which would amount in the aggregate to £18,636. That was a very delusive mode of arriving at the value, because the capital seldom represented actually the value of the property. When Mr. Stevenson, on behalf of the Board, and Mr. Loam, on behalf of the Gas Company, went over the works to ascertain their structural value, the results were within a pound one of the other, although they were strictly independent. These estimates put the structural value at over £14,000; and then there was the important item of goodwill to be considered, which did not seem to be provided for by the £12 per share. When the latter proposition was made to the Shareholders it was voted by more than two to one. It was certain that in the £18,000 not a shilling of prospective value could have been reckoned. He had gone carefully into this matter, and being fortified by Mr. Stevenson's statement, he was certain that such could not have been the case. The sum that was subsequently agreed upon—£25,000—seemed to be a fair and reasonable one as between seller and purchaser. The first negotiations having been voted by the Shareholders—which, he repeated, was a very wise act—the matter fell through. Thereupon the Company went to Parliament in the session of 1877, under the auspices of the Board of Trade, for the purpose of extending their powers with regard to capital. They put their share capital at £12,048, and asked power to raise a further considerable sum. That was opposed by the Local Board, and a petition was forwarded to the Committee of the House of Lords on the subject. The petition stated that the supply of gas to the town of Ilkeston had long been unsatisfactory, and was a subject of general complaint, the quality of the gas being bad, and the price charged very high; further, many inhabitants had not been able to obtain a supply, and where the gas had been lighted it had frequently gone out; the public lamps had also been inadequately supplied. The fact was that the town had gone on increasing rapidly, and there had not been that spirit of enterprise on the part of the Company that might justly and reasonably have been expected. On the 20th of June the Company appeared by their Counsel before the Committee of the House of Lords, and the way in which the Committee treated the question was, no doubt, the cause of the negotiations being re-opened for the sale of the works. That culminated in a provisional agreement that the sum of £25,000 should be paid for the works and plant, and a sum, not exceeding £500, for the costs of the Company's application to Parliament. This agreement was dated the 25th of June, 1877, and was agreed to by both parties. About the last item—the £500—there was a slight difference, which was not yet settled. The course pursued in the House of Lords was this: He did not mean to say that the Committee openly encouraged the transfer, but they facilitated it by adjourning the inquiry to allow the arrangements to be completed. The inquiry was accordingly adjourned for a week or ten days, and, in the meantime, a preliminary agreement was entered into. Afterwards a public meeting was called, the terms of the agreement were ratified, the document was signed, and had the seal of the Board affixed to it on the 4th of September, 1877. With regard to the £500 to defray the costs of the application, there was this little hitch. The costs had exceeded this sum by a few pounds—something like £40 or £50—and the Company insisted that the clause should be altered to cover the total amount; therefore, if the clause was altered so as to read "a sum not exceeding £600," there would be no difficulty about it. On the 5th of November, 1877, the Local Board presented the memorial to the Local Government Board for this Provisional Order. With regard to the price the Company had agreed to take, and the Board had agreed to give—£25,000—there would be the question as to whether or not the Board, by paying this sum of money, could work the business at a profit. The Inspector would hear from Mr. Stevenson that the Company had done exceedingly well in a pecuniary sense, and had done so although there had been considerable mismanagement. He said that, by the outlay of £3000 or £4000, at least £1500 a year could be earned. Thus at once they could make a profit, charging a reasonable rate for the best description of gas, of at least 5 per cent. He then proceeded to speak of the population in Ilkeston between 1871 and 1878, and of the increase in the number of houses. What spoke even more loudly for the progress of the town was, that in 1871 there were 160 or 170 uninhabited houses, and now it would puzzle anybody to find one. Within the last few years, too, a line of railway had been promoted, with which, he was proud to say, he had something to do. It ran from a place called Awsworth Junction, forming a connection with Nottingham, Grantham, and London, then proceeded through Ilkeston, where there was a first-class station, to Derby, where it crossed the town to a station in the principal thoroughfare, and so on to Burton-on-Trent. The line was opened a few weeks ago for goods traffic, and next month it would be opened for passengers. It was impossible to say what effect this line would have upon the development of the resources of Ilkeston, which were most valuable and prolific. He trusted that the result of the inquiry would be that the Local Board would take over the gas-works on the terms mentioned.

Mr. *Wm. Wade*, Chairman of the Local Board, said he was acquainted with the formation and history of the Gas Company. They had supplied gas to the town, and there had been great dissatisfaction as to the supply. Last year the Local Board took over the Water Company. The Board had a memorial in 1875, signed by over 150 of the inhabitants, praying the Board to take over the gas-works. The Board had no interference in that memorial. Upon this a public meeting was called to discuss the question. The meeting was held on Dec. 29, 1876, and the resolution to take over the gas-works was carried, with one dissentient. A poll was demanded, which took place in January, 1877, the result being as already stated. The meeting was called to oppose the Company's application to Parliament for extended powers. After that negotiations ensued between two or three members of the Board and one of the Directors of the Company, and an agreement was made that £12 per share should be paid. When that was brought before the Shareholders in March, it was vetoed by two to one, and the Company went on with their application to Parliament. He was present at the inquiry before the Committee of the House of Lords, which ended in a preliminary agreement between the Board and the Company to take over the works for £25,000, and a sum not exceeding £500 for costs. He did not think there was any dissatisfaction in the town as to the terms, and he believed the inhabitants were generally pleased at the prospect of the Board taking the works. The Company were formed under a deed of settlement, and had no parliamentary powers or obligations. As a matter of fact, the Company had refused to supply some consumers. He himself had been put to considerable inconvenience by the want of purity and illuminating power in the gas.

The Inspector asked if there was anybody present representing the Gas Company, and a gentleman present said he and another in the room were Shareholders in the Company. They were not dissatisfied with the bargain.

Mr. *W. Lissett*, Clerk of the Ilkeston Local Board, confirmed the Chairman's statement, as to the dissatisfaction expressed with regard to the operations of the Company. He was present at the inquiry before the Committee of the House of Lords. He thought that £25,000 was a proper sum to pay for the works as a going concern.

Mr. Leech: Do you think that the works could be made capable of meeting the requirements of the district?

Witness: I feel confident that they could.

Mr. Leech: Have you heard general dissatisfaction expressed with regard to the present supply?

Witness said he had. So far as he knew there was no opposition on the part of the Shareholders. The Local Board had just taken over the water-works, and the deed of conveyance was being prepared. In the interest of consumers, as well as of the ratepayers, it would be a good thing for the Board to take over the gas-works.

Mr. *George Wilson Stevenson*, C.E., said: I am an engineer at Westminster, and have been in practice more than 30 years. During that time I have paid much attention to gas and water works, and have been concerned in many transfers of these to local authorities. I was consulted by the Local Board of Ilkeston when the Gas Company made their application to Parliament. I then made a careful examination of the works both as to their structural and commercial value. Mr. Loam, Consulting Engineer, of Nottingham, also prepared a structural valuation, and we communicated the results to each other. The valuations were made quite independently, and the result was that my valuation came out £14,303, and Mr. Loam's £14,304—such a near conclusion as I never before experienced. Looking upon this as a going concern, having a monopoly of the district, a considerable sum should be added for the goodwill. The purchase of a gas undertaking is never made upon the structural valuation. The object of the valuation is to ascertain whether the capital is represented by the works and plant. I found in this case that it was more than represented, showing, in fact, that the Company had been increasing their plant out of the pockets of the consumers instead of their own. £25,000 is, in my opinion, a fair and proper sum to pay for the purchase of the works. I think the Local Board would get the undertaking on very cheap terms. In my opinion they were quite justified in opposing the Company's application to Parliament, because if the Company had been successful they would immediately have obtained their share capital of £12,000 entitled to 10 per cent., and being a statutory Company they would have got 25 years purchase, which would have amounted to more than £30,000. I think the Board made an excellent bargain, which was mainly brought about by their opposition to the Company obtaining statutory powers. I found the works very defective, working with iron retorts, and an exhauster was not employed. The consumption of coal was very large, much larger than it need be. The gas unaccounted for was very great. The leakage of the gas was nearly 5 million feet, or 28·25 per cent. of the whole quantity. The consumption of coal was over 2000 tons. On £25,000 there would be a profit of £1406. In this I have taken the sale of 8500 feet per ton, which is a moderate estimate. Upon that standard I have ascertained the tonnage of coal required, and the expense of labour and management, and so on, and brought out the total profit at £1406, as against £1167 which the Company made. I have excluded, of course, all balances brought forward and sums paid for dividends, and I have excluded also any sum paid to Directors. Putting the cost at £30,000, that would represent 21 years purchase on the profits of 1877, and with this further capital expended upon the works there would be an increase of operations and a larger profit. I am of opinion that there is plenty of room in the place for increase of business. It is a mineral district, and up to a certain point there will no doubt be an increase of population.

The Inspector: Will there be any purchase of land required?

Witness: There is abundance of land, and the buildings do not require extension. The iron retorts want taking out, and clay substituting. Several other little matters also require attention. The expenditure will be covered by the difference between £25,000 and £30,000, including the cost of the Provisional Order.

Mr. Leech: Four and a half per cent. on £30,000 would be £1300 a year. Are you of opinion that if these alterations are made, the profits would be £1500 a year?

Witness: I do not know whether you will borrow at 4½ per cent. I have reckoned it upon that, however.

Mr. Leech: We shall try to get it at 4 per cent.

Mr. *Stevenson:* £195 a year set aside at compound interest will extinguish the debt in 50 years, and the works will then be the property of the ratepayers. If the Local Board please, they may pay the sinking-fund out of the profits from the gas, but as the ratepayers are purchasing the works by instalments extending over 50 years, it seems better that the £195 should come out of the rates. In the interest of consumers, as well as the ratepayers, it is most desirable that the Local Board should take over the works. If the Company had been successful in their application, they would have raised new capital at 7 per cent., and the Local Board will get their money at 4 per cent.; so that the saving to the consumers will be the difference between these figures. I think it is desirable that

all works that affect the streets should be in the hands of the local authorities. I believe that the new line of the Great Northern will have some effect in developing the resources of Ilkeston.

In answer to the Inspector, Mr. Leech suggested that it would be better to alter the clause respecting the costs to "a sum not exceeding £600," £550 would cover the amount.

The Inspector: That would be the simpler way of dealing with the matter. If you delay, you may lose the session.

Mr. Leech intimated that he would call a special meeting of the Board to consider the alteration, and would forward the decision to the Inspector, that he might embody it in his report.

The inquiry then terminated.

EXTENSIONS AT THE DARLINGTON CORPORATION GAS-WORKS.

On Saturday, the 9th inst., the members of the Darlington Town Council assembled, by invitation of the Chairman of the Gas Committee (Alderman Kitching), to pay a visit of inspection to the new gas-works, which have just been completed, on the left bank of the Skerne, opposite to the old works, with which they are connected by a bridge over the river. After the inspection, the civic party were entertained at luncheon by the Chairman, who has been at the head of the Gas Department for more than 20 years, and who took the present appropriate opportunity to give a somewhat detailed account of the progress of gas lighting in the borough. The substance of his remarks will be found in the following extracts from a local contemporary:—

The gas-works of Darlington were originally erected by a Mr. West, who built the apparatus at his own cost, and carried them on as a private speculation. On the 11th of November, 1830, the town was first lighted with gas. In the year 1846 a number of gentlemen in Darlington formed themselves into a company, and purchased the works from Mr. West. In the year 1849 the Company applied for an Act for the exclusive supply of gas to Darlington and its suburbs.

In 1854 the Darlington Local Board of Health obtained an Act which authorized them to purchase the gas and water works, and borrow to the extent of £59,000. The gas-works appear to have been well managed in this early part of their history, and to have yielded a large dividend to the Shareholders. The works had only been nine years in the hands of the Company, when the Local Board of Health thought that the gas supply should be in their hands, and that they would be a good investment for the ratepayers. They had no sooner made up their minds to this course than they negotiated with the Company for their purchase. Fortunately for the Local Board, the gentlemen who were at the head of the Gas Company took a deep interest in the welfare of the town, and handed over the works to the Local Board at a reasonable price.* In 1854 the price charged for gas was 5s. per 1000 cubic feet, and this price was not altered in any way up to the year 1860, with the exception of the year 1855, when a charge of 5s. 6d. per 1000 cubic feet was made. In 1861 the price was 4s. 8d. per 1000 cubic feet, and from that time to the present the price has gradually been reduced, and is now 3s. per 1000 cubic feet net, with 8d. per 1000 discount if the bills are paid in one month.

At the time of purchase the annual make of gas was 18,002,000 cubic feet, and in the year 1864 the annual make of gas was 36,765,000 cubic feet, or more than double what was made in 1854. This extraordinary increase in the demand for gas necessitated the enlargement of the works, and the main-pipes in different parts of the town. In order to carry out those extensions properly, the Local Board called in Mr. George Emmott, Gas Engineer, and under their directions Mr. Emmott carried out what was considered to be necessary to ensure a good supply of gas to the town. At the time Mr. Emmott was called in, the Company manufactured all the gas in small round retorts of 12 inches in diameter. Mr. Emmott was of opinion that this was not a profitable mode of carbonizing coal, and he had them replaced by the large and small ovens now in use, which have given entire satisfaction. The purifying apparatus was at the same time considered insufficient, and, in carrying out the extensions, the Local Board had the apparatus greatly enlarged, for the purpose of being able to manufacture and purify a much greater quantity of gas, to meet the growing demand. But, from the year 1864 to 1874, the increased demand for gas was much greater, and out of all proportion to what it had been in any previous ten years of the gas-works history. In 1864, as before stated, the quantity of gas made was 36,765,000 cubic feet, whereas in 1874 it had reached the large figure of 93,674,000—showing an increase for the ten years of 56,909,000 cubic feet, or 154 per cent. This was a much greater increase than had been anticipated; and it was again found necessary to make further extensions. The 10-feet purifiers had again to be replaced by four purifiers, two 16 feet square, and two 20 feet by 16 feet; and two large scrubbers had to be erected to cleanse the gas from ammonia. It was also found necessary to erect a new set of condensing apparatus; a new engine and exhauster, to pass 40,000 cubic feet of gas per hour; and a new station-meter. The small gasholders then in use were found quite insufficient for storing the gas, made during the day to supply the town with at night, and they were replaced by two large telescopic gasholders, capable of storing 326,000 cubic feet. In order to carry out these extensions, the Corporation purchased a small piece of land on the west side of the present works, from Mr. John Pease, on which they erected a gasholder and additional retort-house.

The increased demand for gas proceeded at such a rapid rate during those ten years, that the original site of the works was completely filled up with the extensions that had been made from time to time in their plant, and the Gas Committee saw that in order to meet the wants of the consumers they would require an additional quantity of land, and a large increase in their manufacturing apparatus, to provide for this increased demand. They accordingly purchased about 3½ acres of land on the east side of the Skerne, adjacent to the present works, and erected apparatus capable, at the present time, of manufacturing 120 million cubic feet of gas per annum. By enlarging the retort-house, the Gas Committee could manufacture and purify double the quantity at present required for Darlington. It will thus be seen that the duties of the Gas Committee for the last 20 years have been of an arduous nature. In 1850 the gas made was 11,228,500 cubic feet; in 1877 the gas made was 117,521,000 cubic feet, or nearly eleven times what was made in 1850.

But the extensions at the works did not embrace all that the Gas Committee had to look after. They had from time to time to take up small and lay down larger mains, and extend these mains from time to time as the town increased. The principal gas-mains in the town at the present time are capable of conveying double the quantity of gas that is now required. Alderman Kitching, the present Chairman of the Gas Committee, was one of the promoters of the Gas Company 32 years ago; and from that time to the present he has taken a deep interest and prominent part in the management, and to him, in a great measure, may be attributed the success and prosperity of the concern.

The following table shows the increase in the demand for gas from 1850 up to the present time:—

Year.	Number of Retorts in Action.	Gas made per Annum in Cubic Feet.	Increase per Cent.	Decrease per Cent.	Coals used in Tons.	Price Charged by 1000 Cubic Feet.
1850	38	11,228,500	—	—	1,216	—
1851	27	14,297,400	27·33	—	1,608	5s. 0d.
1852	18	16,896,700	18·18	—	1,736	5 0
1853	18	17,363,000	2·75	—	1,909	5 0
1854	24	18,002,000	3·68	—	2,050	5 0
1855	34	21,242,000	17·99	—	2,448	5 6
1862	30	27,846,000	31·08	—	3,239	4 2
1863	30	31,377,000	12·68	—	3,361	4 2
1864	30	36,765,000	17·17	—	3,832	4 2
1865	36	41,950,000	14·10	—	4,198	4 2* / 3 8†
1866	30	39,805,000	—	5·11	3,992	3 8
1867	36	44,622,000	12·10	—	4,492	3 8
1868	42	49,786,000	11·57	—	4,972	3 8
1869	42	54,685,000	9·84	—	5,470	3 8
1870	48	58,757,000	7·44	—	5,876	3 8
1871	48	67,267,000	14·48	—	6,727	3 8* / 3 2†
1872	54	70,416,000	4·68	—	7,120	3 2
1873	66	84,051,000	19·36	—	9,095	3 2* / 3 6†
1874	76	93,674,000	11·45	—	10,000	3 8
1875	81	100,167,000	6·93	—	10,009	3 6
1876	87	113,248,000	13·05	—	10,925	3 2
1877	97	117,521,000	3·77	—	11,870	3 0

* Ending June. † Ending December.

The new retort-house is 163 feet long, 54 feet wide, and 21 feet high to the spring of the roof. It contains 120 retorts, capable of carbonizing 60 tons of coal per day, or producing 600,000 cubic feet of gas. This was about equal to the capacity of the old retort-house, but the new building is so constructed that, should the demand for gas require it, it can be increased to double its present size. The new gasholder will be capable of storing 392,700 cubic feet of gas, or equal to two-thirds of one day's make in mid-winter. The pressure of gas is regulated by means of very effective governors, and, by means of a 14-inch connection between the old works and the new holders, could be filled from either works.

The cost of the new works up to the close of last year was as follows:—Retorts (120), £3710 11s. 10d.; boundary wall, £661 10s.; condensers, £782; engines and boilers, £946 11s. 5d.; station-meter, £570; gasholder and tank, £7546 3s. 7d.; land, £3089 12s. 2d.; new meter-house, offices, purifying-house, &c., £5167 9s. 9d.; purifiers and scrubbers, including pipes, £2878 2s. 5d.; retort-house and chimney, £3866 3s. 10d.—total, £29,218 5s.

In conclusion, the Chairman congratulated the Corporation and the town on the completion of such handsome works—works second to none—and which had been constructed under the direction of the Committee and their excellent Manager, Mr. Smith, without a penny having been paid as commission for the assistance of any Engineer whatever.

After the address of the Chairman, the Mayor of Darlington (Mr. Fay) proposed the health of Alderman Kitching, thanking him for his interesting information, and congratulating the Gas Committee that gas-making in their hands had proved to be a profitable operation. They had now something handsome in the bank for the ratepayers, in the shape of gas and water profits, and he hoped the Chairman of the Committee would live to see, in more prosperous times, a fund accumulate from the production of the new works, and have a word in the spending of it. Alderman Kitching appropriately acknowledged the compliment paid to him. The Ex-Mayor (Mr. Plews) complimented the Gas Committee upon the success of their undertaking. The members of the Town Council had frequently been rather hard upon the Committee, but they had successfully completed their works. They had been wonderfully lucky in obtaining the services of an excellent Manager, and he had great pleasure in proposing the health of Mr. Smith, the Manager. Mr. Smith returned thanks, and sundry other toasts followed, and were heartily responded to.

* The price paid by the Local Board was at the rate of £200 for each £100 of share capital.—Ed. J. G. L.

HEREFORD CORPORATION GAS SUPPLY.

At the Meeting of the Hereford Town Council, on Thursday, the 7th inst.—the Mayor (Mr. W. Stallard) in the chair—the following report of the Gas Management Committee was presented:—

We lay before the Council the accounts made out by the Accountant, Mr. Capner, showing the results of the working for the past year, and his report accompanying the same.

From these it will be seen that the sum of £3604 now stands to the credit of the net revenue account, and the Committee have, out of this, repaid to the City Treasurer the sum of £452 2s. 5d., being the aggregate amount of the sums previously advanced out of the city funds for the purpose of carrying on the gas-works.

The following comparative statement of results arrived at will, no doubt, be interesting:—

	For Year ending Dec. 31, 1876.	For Year ending Dec. 31, 1877.	Increase.	Decrease.
Coals carbonized, tons	5,123	5,169	46	
Gas produced, feet	53,629,000	54,194,000	565,000	
Gas lost or unaccounted for	5,683,326	5,962,500	279,174	
Average make of gas per ton of coal carbonized	10,466	10,484	18	
Maximum quantity made in 24 hours	282,000	271,000	—	11,000
Maximum quantity delivered in 24 hours	293,000	301,000	8,000	

The average illuminating power of the gas during the past year has been equal to 14·56 standard sperm candles, consuming at the rate of 120 grains per hour in comparison with Sugg's new "London" standard Argand burner, consuming at the rate of 5 cubic feet of gas per hour.

We have considered the report of Mr. Stevenson with reference to the proposed increase of the works, and particularly as to the question whether it will be desirable to retain them upon the present site or to remove them, and the majority of the Committee are of opinion that it will not be desirable to incur the expense of a removal.

The following is the Auditor's report with the accounts appended thereto:—

Hereford, Feb. 25, 1878.

The Committee, Hereford Corporation Gas-Works.

Gentlemen,—Agreeably with your instructions, I have audited the Corporation gas accounts for the past year, and now beg to hand you statement of same.

On comparing the results with those of the previous year (1876), it will be seen that the business has been conducted at an increased profit, but in consequence of the reduction made of about £305 on account of "public lights," and a discount of £279 8s. 11d., allowed to "private consumers," the surplus balance added to new account, 1878, is £1199 8s. 9d., as against £1428 8s. 11d. in 1876, making the total of surplus balances carried forward £3604 16s. 6d.

The low price at which coke has been sold for some months past has also affected the

receipts unfavourably, but this decrease has been more than counterbalanced by increased profits under other heads, as shown in the supplementary accounts.

One encouraging feature in the year's transactions has been the increased demand for gas by private consumers, the rental under this head showing an increase of £190 12s. 11d., a result full of promise for the future.

Having thus drawn your attention to the most important feature of the accounts, I do not deem it necessary to trouble you with further details.

(Signed) J. W. Capner.

Dr.—*Capital Account, Dec.* 31, 1877.

To Loan, 1872, repaid to July 4, 1876		£3,856	18	7		
Do., 1872, further repaid to July 5, 1877		1,075	1	11		
Do., 1875, repaid to July 4, 1876		50	0	0		
Do., 1875, further repaid to July 5, 1877		50	0	0		
					£5,032	0	6
Balance unpaid					51,467	19	6
					£56,500	0	0

Cr.—*Capital Account.*

By Cost of works and expenditure to Dec. 31, 1876	£55,712	11	11			
Subsequently expended	116	13	2			
				£55,829	5	1
Balance				670	14	11
				£56,500	0	0

Dr.—*Profit and Loss Account, for the Year ending Dec.* 31, 1877.

To Coals consumed, cost	£3,287	12	3			
Purifying	118	0	11			
General repairs—wear and tear	784	8	9			
Repairs to mains and services	26	3	4			
Lamplighting and repairs	245	14	5			
Gas-making—wages	701	5	7			
				£5,163	5	3
Salaries	£335	15	0			
Rates, taxes, and insurance	400	8	11			
Stationery, printing, &c.	57	12	8			
Law expenses	2	0	7			
				795	17	2
Total expenditure				£5,959	2	5
Net revenue account, balance transferred				4,634	6	1
				£10,593	8	6

Cr.—*Profit and Loss Account.*

By Gas-rental for public and private lights for twelve months				£9,465	12	6
Special contract, and bad debts recovered				4	11	7
Residual products (less cartage and expenses)	£611	14	10			
Tar, coke, liquor, &c.	378	3	5			
				989	18	3
Fittings, &c., profit thereon				113	8	7
Abatements				19	17	7
				£10,593	8	6

Dr.—*Net Revenue Account.*

To Interest paid on mortgage to June 30, 1877				£1,136	6	9
Ditto accrued and owing, Dec. 31, 1877				1,112	8	11
Ditto paid on additional loan of £1500, June 30, 1877	£31	0	7			
Ditto ditto, Dec. 31, 1877	29	19	2			
				60	19	9
Loan redemption-fund, amount transferred to credit account				1,125	1	11
				£3,434	17	4
Balance, surplus to new account, 1878				3,604	16	6
				£7,039	13	10

Cr.—*Net Revenue Account.*

By Balance brought from last account				£2,405	7	9
Ditto brought from profit and loss account, being profits for twelve months to Dec. 31, 1877				4,634	6	1
				£7,039	13	10

Dr.—*Loan Redemption-Fund.*

To Cash paid—instalment on loan, 1872				£1,075	1	11
Ditto—ditto, 1875				50	0	0
				£1,125	1	11

Cr.—*Loan Redemption-Fund.*

By Net revenue account—balance transferred				£1,125	1	11
				£1,125	1	11

Dr.—*General Balance-Sheet.*

To Capital account, balance unexpended				£676	14	11
Sundry tradesmen and others, amounts due from coals, fittings, &c.				898	3	7
Interest accrued and unpaid mortgage to Dec. 31, 1877				1,112	8	11
Amount due to Treasurer				72	15	7
				£2,751	3	0
Net revenue account, balance at credit				3,664	16	6
				£6,358	19	6

Cr.—*General Balance-Sheet.*

By Amount owing to debtors for gas and meter rental, including the quarter's rental ending Dec. 31, 1877	£3,091	5	3			
Less deposits received	36	0	0			
				£3,055	5	3
Debtors, for residuals, viz.—						
Coke	£391	1	3			
Tar	124	13	8			
Lime	9	13	7			
Liquor	28	12	6			
Fittings	269	12	0			
				825	13	0
Stock of material on hand, viz.—						
Coals	£268	10	6			
Fittings and general stock	536	18	0			
Purifying material	86	5	0			
Coke	50	14	0			
Tar and ammonia	20	0	0			
Gas	4	13	0			
				967	0	6
Cash on deposit at bankers				1,500	0	0
Interest allowed by ditto				11	0	9
Cash in hands of manager				—		
				£6,358	19	6

Mr. Shellard moved the adoption of the report. He reviewed at some length the history of the gas undertaking, and expressed his conviction that the future increase in the demand for gas would be much less than it had been in past times. Mr. Stevenson's recommendations were based on the assumption that the present consumption would be doubled in 14 years; but, in his (Mr. Shellard's) opinion, at least 30 years must elapse before such a result was arrived at. Moreover, it did not follow that double the consumption of gas meant gas-works of double the size. There were several important parts of the works which would not necessarily require doubling. Was there any one unscientific or bold enough to say that in the next 30 years science would not have discovered some improved system of making gas, or to deny the possibility that as gas snuffed out candles, so electricity would snuff out gas? He had faith in the discoveries of science, in the advancement of electrical discoveries and appliances, and 30 years was quite far enough ahead to look. At the present time the Corporation were loaded with a debt of £51,500, in round numbers, of the unpaid annuities for the gas-works. Mr. Stevenson had estimated the cost of removing the gas-works to the proposed new site at £25,800, and in that amount he did not include new mains, which were calculated at £400, nor was anything said about central offices in the city, and other matters of detail, which all meant the expenditure of a considerable sum of money. Instead of £25,800, the cost of removal would be more like £30,000, and that, with the existing debt, gave a total of £81,500. It was not fair to the present consumers and ratepayers to load them so heavily to the relief of posterity. He was proud to know the profits of the works had been very large, that it was a good speculation on the part of the Corporation to buy them, that it was still a highly remunerative property, and that it would pay very handsomely; and he would not say that they might not lay out this money on the works without increasing the taxation of the city. But, admitting that they could spend the money without increasing the taxation of the town, was that any reason why they should not try and reduce the taxation? Was there any reason for continuing the high price of gas if they could reduce it? Let the present generation have some of the benefit of the undertaking. The recommendation of the Committee, that it was not expedient to remove the works, was based upon indisputable argument, and he asked them to confirm that recommendation, believing they would in so doing be acting justly towards themselves and generously towards those who were to come after them.

Alderman Carless seconded the motion, remarking that when the Corporation bought the works, better and cheaper gas was promised. How far was that promise fulfilled? Certainly not as regarded the price, for gas was 3d. per 1000 feet dearer. What benefit had the consumers—for it was the consumers more than the ratepayers generally who were concerned—derived from the transfer of the works to the Corporation? Those who advocated the transfer were surprised at the large amount of money awarded by the arbitrator; but if they had been told that in five years time they would want to lay out another £30,000 on them, it would have surprised them still more. It was a very profitable investment, no doubt, if the works were carried on judiciously, but how were the consumers to derive any advantage if they were made to yield such a profit? Or how would they benefit if there was a reckless expenditure of money upon them? Looking at the enormous debt that still hung over the works, and at the proposal to spend several thousands of pounds more on them, it was not clear to him how there was going to be any reduction in the price of gas. He granted that posterity might reap some advantage, but that was not the only point to be considered. His own opinion was, that they would derive all the advantages by increasing the present works. In 10, 15, or 20 years the consumption of gas might be greater, but there was no certainty about it, therefore it would be unwise to remove the works from their present situation. As to their liability to be flooded, he had never known Hereford in darkness from that cause.

Alderman Anthony moved, as an amendment—"That it is inexpedient to spend more money upon the present works." He expressed his surprise at the meagreness and unsatisfactory character of the report of the Committee. It was a mere negative to the proposition to remove the works, but it left totally untouched the question of whether it was desirable to lay out £14,000 or £15,000 on them where they stood. In fact, the Council were left in the dark. He would ask the Committee whether they proposed to lay out £14,000 or £15,000 on the present works? To do so would be a great mistake; but if they were to stay there, they must make such an outlay.

Mr. Ralph seconded the amendment in a long speech, in the course of which he expressed his opinion that it would be wrong to expend a large sum of money upon the old works. He believed that, having consulted a competent man to advise them, the best thing the Council could do was to follow his advice.

Mr. Smith said he considered the consumers should be allowed to share some of the advantages derived from the profitable character of the works, and should not have to pay more than other towns were paying; and not only the consumers, but the ratepayers, who paid for the public lamps, ought to get some benefit from a reduction in the price of gas. It was all very well to be able to show a large balance; but it was hardly the thing to get it by overcharging the consumers of the gas. He therefore opposed the construction of new works, on the ground that the increased consumption of gas did not justify the expenditure, arguing that they could not rely upon the same increase in the future as had taken place in the past. Before the Council decided upon new works, a public meeting of the ratepayers ought to be called. The old works, with £14,000 well expended on them, as no doubt it would be under the supervision of the Committee, would be adequate; and, holding that view, he should vote for the adoption of the report.

Mr. Bowers supported the amendment, believing the Council should be guided very much by Mr. Stevenson's report. It was useless to obtain the advice of a professional man and then ignore it.

Mr. James remarked that if the question of erecting original works came before them, no one could propose erecting them where the present works stood. But there they were, and the question was, were the advantages to be derived from the expenditure of £14,000 sufficient to compensate them for the outlay? On the other hand, with regard to the larger sum, he was not aware that a large expenditure of money was the best economy, and he should dissent from the proposal unless there was to be some great beneficial and profitable result to the ratepayers, and equivalent to the expenditure. With regard to the question of whether it was necessary to remove the works or not, it turned on the question whether the demands upon the works would be doubled, or would be likely to be doubled, in any such period as 14 years. Mr. Stevenson had given his opinion. He was a competent gentleman, and had given his best opinion, and there was no imputation upon his honour or veracity. At the same time, his opinions were merely the result of an average based upon other towns. If they had any local knowledge of the requirements of the city, they should bring it to bear upon the question. At the last meeting he brought forward a statement as to the production of gas for the last 17 years, and he would now invite them to follow him in one or two points with those figures. In the first four years of those 17—1860-63—the consumption of gas increased 4,311,000 feet, equal to a total increase of 21 per cent. During the last four years of the same period the consumption increased 6,410,000 feet, or an increase of 13 per cent. This clearly showed that the increase was not going on at the same ratio as formerly. Again, in the ten years previous to 1864 the consumption doubled itself; but in the 13 years which had elapsed since, it had not doubled itself. In the 14 years ending 1876 the increase was 30,935,000 feet; but in the 14 years ending 1877 it was only 29,731,000 feet. Looked at in any way, these figures showed that the

increase of gas during the recent period was nothing like so rapid as it was during the prior period, and nothing to justify the inference of Mr. Stevenson that the consumption was going to increase to double its present amount in 14 years, or anything like it. What it would increase was a matter of speculation and theory. As to the result of the expenditure of £14,000 on the present works, it appeared to him they would have triple the storeage capacity as compared with what it was now, and double the producing power. The result would be the same in regard to the alternative scheme; they would have double the capacity, but they would spend £25,000 instead of £14,000, and that would enable them to provide for prospective requirements. That being so, he did not see why they should saddle themselves with the heavier expenditure whereby to meet theoretical and problematical requirements, which do not now exist, and might not, perhaps, exist for a long period. With regard to the taxation of the citizens, the money must be paid by them somehow, either in rates, or by keeping up the price of gas. Perhaps it would be better to pay it in rates, instead of keeping up the price of gas, and then the consumers would not be unfairly burdened. If the works were profitable, and yielded a large surplus, there was no reason why some of that surplus should not be applied in reducing the rates or the cost of gas, as well as in reducing the existing debt. The question of whether the purchase of the works was a good or bad stroke of business had nothing to do with the present matter. He knew now he made a mistake when he opposed the purchase, and he did not shrink from saying so. He was very glad the Corporation did buy the gas-works; but he must remind them that they were perfectly in the dark then as to what the profits were likely to be, and he dreaded the effect of an arbitration in the dark. And though he was glad now the works were bought, he was not ashamed that he was in the minority then. With regard to the precedent at Gloucester, they were compelled to move in that case; they had no choice. Mr. Ralph had suggested that a reduction had been made in the price of gas in this way—that while they were paying a higher price than they used to, the quality was better. He was sorry he could not accept that proposition, because they paid 3d. per 1000 feet more than they did, and the only difference in the quality was that last year the illuminating power was 14·33 candles, and this year 14·56. It was, therefore, certainly not cheaper. He could not, consistently with the ideas he had formed, vote for the expenditure; but if the majority of the Council thought otherwise, he should personally be very much pleased.

Alderman Bosley said there was one thing left out of the calculation, and that was the cost of a siding at the old works, which would be about £1200, and would bring the total up to more than £15,000. In the purchase of the new works they were not necessarily obliged to lay out the £25,000 all at once. Further, a large sum was included in this estimate for roads, drains, &c. Now roads and drains existed already, so that these items should be eliminated. Taking, then, the amount at £20,000, the interest on that at 4 per cent. would be just £800; on the £15,000 it would be £560. The difference, therefore, or in other words, the actual cost to the citizens, would be only £240. Against this sum they had to set the sum that Mr. Ralph pointed out would be saved in the carriage of coal—namely, £160 annually. As to the benefit of the works to the city, if the price of gas was not reduced, looking at the considerable amount of money in hand, and the money that had been disbursed in instalments, the citizens were much better off. He was glad the gas supply was now in the hands of the Corporation. He should vote for the removal of the works, because he should be wronging the citizens if he did not do so.

Upon the question being put to the vote, the amendment was carried by 15 to 7, and it was then further resolved—"That the Gas Committee be authorized to decline the purchase of the land offered by the Railway Company, and take immediate steps to ascertain whether a site can be obtained for new works, and to report thereon."

DR. SIEMENS ON LIGHTING BY ELECTRICITY.

On Thursday, the 14th inst., Dr. C. W. Siemens, C.E., F.R.S., delivered a Lecture on "The Utilization of Heat and other Natural Forces," in the City Hall, Glasgow, under the auspices of the Glasgow Science Lectures Association.

The President of the Association (Sir W. Thompson, F.R.S.), who occupied the chair, in introducing the Lecturer, said: We live in an age of scientific wonders. A quarter of a century ago, chloroform, gun-cotton, nitro-glycerine, collodion, and photography formed a remarkable group of discoveries. Within the last three or four years we have had the radiometer, the telephone, and the phonograph in quick succession. Yet these do not exhaust the wonderful applications of science which we may see before us, and which are promised for the future. What would you think of Glasgow being lighted by the Falls of Clyde? coals consumed only at the pit mouth? all engines driven by machines innocuous of smoke? and the atmosphere of our towns restored to its primitive purity? What would you think of your public halls not over-heated by gas and the atmosphere spoiled by sulphurous emanations, but illuminated by the electric light giving 1-20th part of the heat and no fumes? What would you think of no steam power being used to drive the mills of Canada and the United States, but all the power being taken from the Falls of Niagara? If all these do not follow from the principles laid down this evening, it will not be from any want in them. After a few additional remarks in reference to the brilliant and inventive genius of the Lecturer, and his relations to the patent laws, in virtue of which he had become essentially an Englishman,

Dr. Siemens then proceeded with his discourse. It was extensively illustrated by some splendid diagrams, and by a number of striking experiments, involving the use of four powerful magneto-electric machines, three of which were laid down and driven by steam power in a large calendering establishment in the vicinity of the lecture hall. During a considerable portion of the lecture the hall was illuminated by two powerful electric lights, which excited a great degree of interest. The subject of the electric light, as produced by the dynamo-electric machines, formed a prominent feature in the lecture; and as this is, we believe, the first public deliverance of Dr. Siemens on the subject since the electric candle began to alarm Gas Companies, and to excite fond hopes in the minds of Gas Consumers, we now place his remarks on electric lighting before our readers. He said:

When, little more than a twelvemonth ago, I visited the great Falls of Niagara, I was particularly struck with the extraordinary amount of force which is lost, so far as the useful purposes of man are concerned. One hundred millions of tons of water fall there every hour from a vertical height of 150 feet, which represent an aggregate of 16,800,000-horse power, producing as their effect no other result than to raise the temperature of the water at the foot of the Fall—

$$\frac{150 \text{ ft.}}{772 \text{ ft. lbs.}} = 1\text{-}5\text{th deg. Fahr.}$$

In order to reproduce the power of 16,800,000 horses, or, in other words, to pump back the water from below to above the Fall, would require an annual expenditure of not less than 266 millions of tons of coal, calculated at an average consumption of 4 lbs. of coal per horse power per hour, which amount is equivalent to the total coal consumption of the world. In stating these facts in my Inaugural Address on assuming the presidency of the Iron and Steel Institute, I ventured to express the opinion that in order to utilize natural forces of this description at distant towns and centres of industry the electric conductor might be resorted to. This view was at that time unsupported by experimental data, such as I have been able since then to collect, and before concluding this lecture I propose to bring some of the results of these further inquiries before your notice.

Our knowledge of electric force is, as you are aware, of very recent origin. The frictional electrical machine and galvanic battery have been utilized for producing slight effects at great distances, thus giving rise to one of the great institutions of the present age, the Electric Telegraph. We have hitherto failed, however, to produce, by means of electricity, effects in any way commensurate with those produced through the combustion and distillation of coal, which provide us with the means of driving our factories and lighting our towns with gas. It can be demonstrated, indeed, that the galvanic battery, which is dependent for its development of energy on the combustion of zinc, could never economically rival the effects due to the combustion of coal, for the simple reason that it takes 12 lbs. of coal to separate a pound of zinc from its ores, while the amount of energy liberated in the combustion or oxidation of a pound of zinc is represented by 1400 heat units, whereas that by the combustion of a pound of ordinary coal is represented by 12,000 similar units. The great discovery by Faraday of the induced current has enabled us, however, to produce electricity by the expenditure of force, and by a particular arrangement of a rotative armature and electro-magnets (which is chiefly due to my brother, Dr. Werner Siemens), the current so produced may be accumulated and directed in such a manner as to produce continuous currents, more powerful in their quantitative effects than could be accomplished by batteries or any other means. Very powerful currents indeed are produced by means of these machines, properly called dynamo-electric, by the expenditure of mechanical force only, in imparting rotative motion to an armature or keeper of cylindrical form surrounded by insulated wires, laid longitudinally upon the cylinder, and revolving with it in the magnetic field due to the polar surfaces of electro-magnets, the coils of which are excited by the very current set up through rotation in the wire on the armature.

Thus, an accumulative principle of action and reaction is inaugurated, not altogether dissimilar in principle to the accumulative action illustrated by the regenerative gas furnace; and as, in the gas furnace, temperatures can be produced, limited only by the point of dissociation of combustible matter, so the intensity of electrical action producible in the dynamo-electric machine is limited only by the point of ultimate magnetization of which iron is capable. As a matter of fact and experiment, a dynamo-electric machine, such as is actually employed at the Lizard Lighthouse, weighing altogether 3 cwts. 3 qrs., is capable of converting 3·3-horse power into electrical energy, which energy is employed for the production of an electric light equal to 4138-candle power. The smaller machine, which I have placed before you, weighs only 2 cwts. 2 qrs., converts 2-horse power into electrical energy, which energy may be employed for the production of an electric light equal to 1250 candles, or for producing mechanical force capable of being utilized at a distance for giving motion to machinery, for pumping water, or any other useful purpose. Experiments have shown that the amount of mechanical force that may thus be recovered is equal, or nearly equal, to one-half the force expended in the original production of the current.

Let us suppose that at some central station 100-horse power of steam or water power was employed to give motion to several dynamo-electric machines of the dimensions found most convenient in practice, and that, by means of metallic conductors of suitable dimensions, the electric current produced at the central station was conducted to a number of halls or factories requiring to be lighted, or to utilize mechanical power. If illumination were the only object in view, the total amount of light that could be thus produced would be equal to 125,000-candle power. This would be equivalent to 6250 Argand burners, each of 20-candle power, at a consumption per burner of 6 cubic feet of gas per hour, or a total consumption of 37,500 cubic feet of gas to produce the same effect of light. This would require 3¾ tons of coal, and the electric light about as many hundredweight.

It would be fallacious to suppose, however, that, in resorting to the electric light, we should be satisfied with anything like the candle power that now satisfies us in using gas, even as we are not now satisfied with the amount of light of lamps and candles since we have become accustomed to gas lighting. There is this further inconvenience connected with the electric light, that its rays are so intense that they must not reach our eyes without having first been softened down, either by the interposition of some semi-transparent substance, such as ground glass, or by directing the light against screens, or against the ceiling of the room, as was suggested by the Duke of Sutherland, so as to illuminate by reflection only. In making due allowance for these losses of effect, there remains, however, ample margin in favour of the electric light to make it cheaper, and certainly more brilliant, than gaslight. Its practical application for large halls, and places where powerful light-effects are required, will, therefore, be a question only of time, while, for domestic purposes, gas-light will long continue to hold its own, owing to the greater facility which it offers of subdividing the effects of light, and of accommodating its intensity to immediate requirements by simply opening and closing an ordinary tap. My present object, however, is not to discuss the relative merits of the two modes of illumination, but simply to show that power derived from a distant source is capable of being utilized for the production of light of a very brilliant character, a light which is comparable with solar light in showing every object in its true colour, and in producing similar chemical effects, such as the taking of photographic images.

If mechanical force is required to be distributed, the arrangements are, in every respect, similar to those for the distribution of electric light, and it has been proved, experimentally, that the amount of power recovered at the distant station is nearly equal to half the power employed at the central station. At first sight this loss of power may be considered large, but, if we compare the cost of producing a limited amount of power by the magneto-electric machine, and by a gas or steam engine, it will be found that the magneto-electric machine recommends itself, not only by its cleanliness, and by the steadiness with which it can be turned on and off at any moment, but that it is the cheaper machine as far as regards the consumption of coal. In working a small gas or steam engine, the consumption of fuel cannot be taken at less than 8 lbs. per horse power per hour, whereas in working a 100-horse power steam-engine on economic principles, 2 lbs., or say 2·5 lbs., per hour of coal suffice to produce one horse power. Suppose that 45 per cent. of the power available at the central station is reproduced at the distant one, the amount of coal per hour consumed at the distant station would be

$$2{\cdot}5 \times \frac{100}{45} = \frac{250}{45} = 5{\cdot}6 \text{ lbs.},$$

or 30 per cent. less than if a gas or steam engine were directly employed. The principal objection that has been raised by electricians to the conveyance of power to distances of miles, as here proposed, is on account of the apparently rapid increase in the size of the conductor required with increase of distance. In order that the magneto-electric machine may

work under the most favourable conditions, it should have an internal resistance, depending in a great measure upon the nature of the work to be performed, but not exceeding for quantitative effects the one ohm or unit of resistance. If the resistance is greater, a notable proportion of the power expended will be converted into heat in the conductors, causing both loss of effect and great inconvenience. By another law, the electrical existence of the circuit exterior to the machine should be somewhat, but not much, larger than the internal resistance—say, 1½ units. The external resistance is composed of two elements—viz., the conductor and the resistance of the electric lamp, or electro-magnetic machine, which latter may be taken as amounting also to one unit, leaving only half a unit available for the conductor. These conditions determine really the size of the conductor for any distance to which the current has to be conveyed. Suppose the distance to be half a mile, a copper wire of 0·23 inch diameter will produce the half unit resistance to be desired, which is already a wire of considerable thickness, for the purpose of working a single lamp. If the distance be doubled, wire of the same resistance would give twice the electrical resistance; and in order to reduce it again to half a unit its sectional area must be doubled. We have thus a conductor of double length and sectional area, and therefore of four times the weight; and, relying upon this calculation, it is argued that the weight of the conductor must increase as the square of the distance, so that a conductor of 30 miles length would require to be $60^2 = 3600$ times the weight of the half mile conductor, and this enormous increase of weight would certainly be required if the object to be accomplished were the working of one electric lamp by a dynamo-electric machine.

My critics have, however, fallen into the error of overlooking the fact that half a unit resistance is the same for a circuit capable of working one lamp as it is for working a hundred or a thousand lamps. Electricity is not conducted upon the conditions appertaining to a pipe conveying a ponderable fluid, the resistance of which increases with the square of the velocity of flow; it is, on the contrary, a matter of indifference what amount of energy is transmitted through an electric conductor, the only limit is imposed by the fact that, in transmitting electrical energy, the conductor itself retains a certain amount proportional to that transmitted, which makes its appearance therein in the form of heat. If this heat were allowed to accumulate, the electrical resistance of the conductor would increase in proportion to such increase, and a point might be reached where fusion of the wire would ensue. [This fact was illustrated by a thick platinum wire stretched for a length of about 18 feet across the platform, and connected with the magneto-electric machine, becoming raised to an intense white heat. The lecturer proceeded:]

The real power of transmission of an electric current depends, therefore, upon its capability to discharge its heat to surrounding objects, and it will be readily conceived that a wire of 60 times the sectional area, and 60 times the length of another wire, is capable of radiating away

$$60 \sqrt{60} = 460$$

times as much heat per hour as the smaller conductor, and that 460 machines or lights may be supplied through it without causing inconvenience. When, some week ago, I had occasion to use this argument before the Institution of Civil Engineers, your President, who happened to be at the meeting, immediately recognized its force, and with the fertility of mind for which he is so remarkable, there and then suggested a means by which the transmitting power of a large electrical conductor might be almost indefinitely increased by giving it the form of a hollow tube through which water might be made to flow. It is evident that cold water flowing through such a conductor would prevent an inconvenient accumulation of heat in the metal, and in would not be difficult to introduce and discharge the flowing water at intervals from the pipe without interfering with the necessary insulation of the conductor from the earth.

After this digression, let us return for a moment to my proposal of last year to convey 1000-horse power a distance of 30 miles through a conductor 3 inches diameter. The electrical resistance of this conductor would be 0·18 of a unit; and, supposing that the total resistance in circuit was made 2½ units, which, as I have before stated, gives a favourable working condition, it follows that $\frac{0{\cdot}18}{2{\cdot}5} \times 1000 = 72$-horse power would be expended in heating the conductor. This would represent about 15 lbs. of coal per hour—a quantity quite insufficient to raise a mass of 1900 tons of copper, with a surface of 132,000 square feet, to a sensibly heated condition. So far from admitting, therefore, that I have overstated my case regarding the capability of my large electrical conductor, I am convinced, on the contrary, that its sectional area might safely be reduced to one-half that previously given, or its diameter to 2 inches, whereby its cost would also be reduced one-half.

It would not be necessary to seek on the other side of the Atlantic for an application of this mode of transmitting the natural force of falling water, as there is perhaps no country where this force abounds to a greater extent than on the West Coast of Scotland, with its elevated lands and heavy rainfalls. You have already conducted the water of one of your high-level lochs to Glasgow by means of a gigantic tube, and how much easier would it be to pass the water in its descent from elevated lands through turbines, and to transmit the vast amount of force that might thus be collected by means of stout mechanical conductors to towns and villages for the supply of light and mechanical power.

AUTOMATIC GAS LIGHTING.

At the Ordinary Meeting of the Society of Arts, held on Wednesday, March 6—Professor John Tyndall, LL.D., D.C.L., F.R.S., &c., in the chair—the following paper on the above subject was read by Mr. St. George Lane Fox, whose invention was described and illustrated in the Journal of Jan. 1, page 18:—

Arranged along the walls of this theatre there are several gas-burners connected with the gas-mains, and controlled by an electrical apparatus I have on the table. I would ask you to imagine that each one of these lights or burners represents a street lamp, removed from me at a considerable distance, and some 30 or 40 yards apart. Now, it is evident that, if the double operation of lighting and extinguishing these lamps is to be performed by me, I should have to go to each separate lamp twice so as physically to operate on them, or else I must have some means of action at a distance; and this latter process is commonly spoken of as automatic gas lighting. Now, looking over the various forms of action at a distance at our disposal, it will be seen that light, heat, and sound must be set aside as inapplicable to the purpose; there remains, therefore, mechanical action, either direct or otherwise, and electricity.

When the matter was first taken up some years ago, and it was known that an electric spark or a fine platinum wire, rendered incandescent by the electric current, would ignite a stream of gas, it was naturally thought that there would be no difficulty in applying this agent to the lighting of street-lamps, and many large buildings were fitted up with appliances by which a current of high tension electricity was conveyed to the burners by means of insulated wires.

The sunlight in this theatre, for example, is lit by this system, and the Albert Hall, the Assembly Rooms in Paris, and various other places are similarly treated; in all these cases the gas is turned on and off at the main. This system is extremely convenient, as sometimes in very large halls the lights are so placed as to be almost inaccessible for the ordinary process of lighting. When, however, it was attempted to convey this high tension current to any great distance, the greatest difficulty arose as to the insulation of the wires; moreover, this method would be only available for producing one, or at the most two or three sparks in a single circuit, and the idea was therefore abandoned. It was also found out that to produce any large number of incandescent platinum wires in circuits of great length, and accordingly high resistance, was also impracticable. In these two systems there are of course no means provided for turning the gas on and off, which is an absolute necessity for any automatic system to be rendered useful. Accordingly, the idea of lighting street-lamps by electricity was, for the time, put aside.

We now come to mechanical action. It has occurred to a great many people that, by increasing or diminishing the pressure of the gas in the mains, it would be possible to actuate an apparatus in each lamp so as to turn on the gas and shut it off, and, by having a small jet burning all day by the side of the principal burner, the issuing gas would be ignited. But, in combination with this pneumatic action, various other methods suggested themselves for producing ignition—such, for instance, as setting up an electric current by raising the level of a liquid so as to bring it in connection with opposing metallic surfaces, thereby forming a galvanic couple; and, in some instances, the heat produced by chemical action has been made use of. After very numerous trials in this direction, I think I may safely say this system has also been abandoned, not only because the alteration of pressure would be a source of serious inconvenience, and even danger, to the consumers, but also because the construction of the gas-mains does not admit of any material increase in the pressure at a distance from the works. A scheme has been proposed in which pipes are laid down to all the lamps, so that, by increasing the pressure and exhausting, a double action can be obtained, so as to turn on and extinguish the gas, but by this means a separate electric system has to be employed for producing the flame.

I will not trouble you further with details of these several inventions, but will proceed at once to explain the method by which I propose to apply and utilise electricity alone as the agent for lighting and extinguishing gas. In the first place, then, I supply every lamp with an apparatus, such as you see it there; next, the lamps must be connected with an insulated conductor, so that, starting from a central station, a wire would travel through each of these machines and back again to the station. I propose that several of these circuits, each connecting and controlling 200 or 300 lamps, should proceed or radiate from a central station, so that from one point several thousand lamps could be operated upon almost instantaneously.

The method by which I have succeeded in producing the ignition of the gas at a considerable distance, and at numerous points, is by supplying each lamp with a small induction coil, so that the primary wires of each one of these induction coils form part of the circuit, so, in fact, as to preserve without a break the metallic continuity of the line. When first the idea suggested itself to me, I connected together two or three of these coils with a battery of six large bichromate cells, and placed in the circuit a private telegraph line of about three miles in length. I joined up the circuit by an ordinary vibrating contact breaker and condenser of tinfoil and paraffined paper, similar to that used in the Rhumkorff coil. On setting the battery in action, and making and breaking contact, I was unable to obtain the faintest indication of a secondary discharge. I accordingly used a very much more powerful battery, composed of 55 very large Bunsen cells. With this enormously powerful current I was just able to feel a small shock from the secondary wires, but could not obtain sufficient spark for ignition of the gas. Accordingly, I considered that this method was not practicable, when it occurred to me that in reality the amount of work to be done, in producing a number of these small electric sparks, was extremely minute, although at the same time requiring to be produced almost instantaneously. Now, the amount of work which an electric battery will produce is dependent on the time during which action continues; and in a single instant, or say the thousandth part of a second, the actual amount of power available is naturally extremely small, and I thought that if I could by any means accumulate this power for a short time, and then bring it suddenly to bear upon the circuit, the desired result would be obtained. As an illustration of what I mean, supposing I was desirous of breaking some extremely hard substance, such as corundum, and I had at my disposal nothing but a very small hammer, it would be quite possible that I should bring an indefinite number of strokes to bear upon this substance without producing any result, while, by accumulating all the energy expended in these blows into one tremendous thump I could reduce this hard substance to fragments. I have here upon the table the apparatus by which I have succeeded in accumulating the electric current and storing it up into this condenser or electric reservoir, composed of glass plates and tinfoil laid side by side alternately.

The condenser, however, is not charged direct by the battery, but the current is made to work this Rhumkorff induction coil, from which there is derived a current having an enormously increased electro-motive force, and it is this electricity that is stored up in the condenser.

Having charged the condenser in this fashion, the whole of the electricity is at once sent through the line, and produces, as I have said, most extraordinary results. So much, then, for the lighting of the gas. The process of turning on and off the gas, although involving many important details, is very simple. I make use of the soft iron core which runs through the centre of the coil to produce a reciprocating horizontal motion of a permanent horse-shoe magnet, suspended on needle-points just above the coil. The soft iron core with the primary coil is, in fact, an electro-magnet, which can be magnetized so as to render its poles reversible at pleasure; the magnets are carried in a small metal frame, having a passage through it for the gas to pass to the burner at the top, and being provided with a stopcock, or valve, which is actuated by the reciprocating magnet. The whole of this apparatus is enclosed in an air-tight metallic case, which measures about 2½ inches high by 2¼ wide, and is screwed on to the supply pipe in the lamp; the insulated conductor or line wire being carried down the interior of the lamp-post and laid under ground, except, of course, where an overhead line is admissible. The turning of the gas on and off is accomplished by opening and closing what may be termed an electric needle-tap. The plug of this needle-tap is cylindrical, and about a quarter of an inch in diameter, and is carried in a socket, which it fits rather loosely. It is made to turn in this socket by the action of the reciprocating magnet, a couple of studs on which are brought into contact with a small pin or lever connected with the plug, and forming, in fact, the handle of the stop-cock. The annular space between the plug and the socket (which is about one-thousandth part of an inch) is filled with some liquid, which is retained by capillary attraction between the two surfaces, the joint being thus rendered perfectly gas-tight. The oil of bitter almonds and glycerine are both well adapted for the purpose, on account of their non-oxidizable character, and from the power they possess of resisting the action of very low temperatures. It will be seen that a special feature in the apparatus

is the introduction of a fixed core, which can be magnetized so as to render its poles reversible at pleasure, and in conjunction with it a movable magnet, the polarity of which is permanent. An electric current sent either forwards or backwards for a few seconds, will turn the gas on or off in every lamp in the circuit, according to the direction of the current.

I have been experimenting for a long time on the subject, and, although I have met with considerable difficulties, I think I am now in a position to state that there is no reason why the system should not be applicable to the lighting of the lamps in any large town. By the kindness of the Directors of The Gaslight and Coke Company, I have been able to test the practical working of the scheme on a somewhat extensive scale, and several lamps have now been in operation for about a year.

I should now like to make a few remarks on the way in which I propose to put the system into practical operation. As I said, there would be for any district of say 2000 or 3000 lamps a central station, from which the wires would proceed in every direction, so as to command a number of distinct circuits. All that is necessary to have at the central station would be a battery of some sort, or, what I would very much prefer, a magneto-inductor—that is, a machine for producing an electric current by mechanical means. As no solutions are used for generating the current, there will be none to replace, and it is always ready for use, so that by turning a handle a powerful current is produced. I believe that these machines have been adopted very largely on the German railways, for releasing clockwork used in signalling, or wherever a rather powerful current is required for a very short length of time. When I say powerful, I mean as compared with the ordinary telegraph currents, which are sometimes not more than the thousandth part of a veber. By means of a switch and a commutator, the electric current from this machine can be directed so as to operate separately on each one of the circuits, and by these means turn the gas on or off. Let us suppose the gas turned on, the next process is, of course, to light it. This is effected, as I have said, by sending a discharge from the condenser. A condenser such as I have here would, I believe, have a sufficient capacity for lighting about a hundred lamps. It is extremely simple in construction. It is constructed of alternate metallic plates, with an insulator or dielectric between them; the conducting surfaces in this case are of tinfoil, and the dielectric of crown glass. A number of plates are used, so as to get a large surface in a small space. The simplest form of condenser is that known as the detonating plane, and consists simply of two sheets of tinfoil pasted on opposite sides of a glass pipe. The coil used for charging the condenser need not give more than about three-quarters of an inch spark in the air. The discharge, like the current, will, of course, have to be sent through each circuit separately, and this is also done by means of the switch arrangement. The chief objection that has been raised to any system of lighting street lamps by electricity is that the conducting wires would be liable to be cut, and so interrupt the continuity of the line. But I am sure that this is only an imaginary difficulty, as it would be a very simple matter to discover the place of rupture and patch it up temporarily, almost as quickly as it would take to light a single lamp by the present process. For instance, a double earth could be made at the point of rupture, so as to divide the circuit into two; besides which it is extremely improbable that more than one circuit would be out of order at the same moment, and just at the time of lighting or extinguishing. I have here a sample of an underground cable, specially prepared for me by Messrs. Siemens Brothers. It consists of a core of one solid copper wire, insulated with two layers of gutta-percha, served with tarred jute, and sheathed with 14 BB. galvanized iron wires, then served with one layer of tarred jute yarn and two coatings of compound. The diameter of this cable is about half an inch. It will, of course, be laid in the ground without any additional protection, being in itself very strong and durable. Cables very similar to this one in construction have been very extensively laid in Germany for the underground telegraph lines. I am, however, of opinion that an overhead line, well out of reach—that is to say, about 16 feet from the ground, and supported as they are now in Pall Mall, would answer well for any small districts where it would be thought too expensive to lay an underground cable.

In the subsequent discussion on the paper,

Mr. DIBLEY said that, having taken some interest in the lighting of the district in which he lived, he was under the impression that Mr. Fox would have given some information relative to the cost of this system, and what saving would be effected by it, because that was really the vital point in the matter. He understood the proposal was to light the gas in the manner shown by a suspended wire, or by a cable laid under the streets; but the carrying on of an experiment at the Fulham Gas-Works would be very different to doing it in a public highway, where he feared there would be an opportunity offered to boys and mischievous persons to play practical jokes if the wires were placed overhead. Again, at the present time, when rates were so high, vestries would be very indisposed to entertain any new scheme, unless they could see that it would be the means of saving money. He hoped, therefore, the lecturer would state the cost of laying cables—which he believed was the only practical method of carrying out the plan—and also the cost of maintenance for lighting 10,000 lamps. Also what supervision would be required, and if it was likely that the Gas Companies would be induced, by the adoption of this system, to decrease the price at present paid for gas per lamp. An experiment might be very successful, but unless it was likely to be economical there would be no chance of its success.

Mr. F. J. BRAMWELL said they had just heard one of those conservative and economical speeches which were the bane of every inventor in England. Mr. Fox had come before the Society of Arts with one of the most ingenious inventions he had ever met with, having tried it on a considerable scale for a year, and now desiring to try it in public; and, instead of receiving the encouragement he deserved, he was met with the objection that, unless he could say at the outset what was to be saved by it, he was not to be listened to. Gas lighting had originated in England, but it was left for the Continentals to show us that, though it required a man to go up a ladder to light an oil-lamp in England (for, on the Continent, the lamp was lowered), a gas-lamp might be lit by a light on the top of a pole, and that plan had been adopted for 12 years in Paris before it was followed in London. He had not the slightest doubt that, if this invention were taken up—as he hoped it would be—and worked for a year, it would then receive the support of the London Vestries. Passing from that point, he desired to say a few words in commendation of this most excellent invention. What was the problem Mr. Fox had set himself? First, how to turn the gas on; having got it turned on, how to light it; and, lastly, having got it lighted, how to put it out. These were not very easy things to do from a distance. Dealing with a large number of lamps, he said that the enormous power required seemed to beat him, but that when he thought of it he found that the requirement was enormous only for a short time, and that if, therefore, he could utilize for a period a small power and store it up, as a man stored up his small income till quarter-day, so that then, without having a large income, he could pay his rent when it was due, this difficulty would be got over. Then, as to turning the gas on and off, he had shown a most ingenious method, by which he had the means of producing a reverse motion in the permanent magnet which turned it on, and having done so he was not compelled to keep the power on during the whole time the gas was burning, as if it had to counteract a spring which would turn it off, but could, by one action, turn it on and leave it burning until he was pleased to reverse the current to turn it off. Then there was the difficulty of the gas-taps, in which—made as well as they could be—there was always considerable friction. He appeared to have directed his attention to this in a most ingenious way. He did not attempt to get power enough to turn on a tap with ever so small a friction, but used a weighted lever to perform a rapid rotation, and when it had performed a considerable rotation, and got a momentum, and was at the point of greatest attraction, then it acted on the tap, when it would be able to overcome the small friction which there was, and which besides was reduced to a minimum by using glycerine or oil of almonds, which would not become sticky or evaporate, but would bear a pressure of 8-10ths of an inch, though the real pressure was probably not more than 2-10ths after the governor was interposed between the pipe and the burner. This showed how one invention grew out of another, for he did not think it would have been possible to use this invention if gas-lamps were not fitted with governors, because there would be the difficulty of suiting the taps to the various pressures; but as lamps were now fitted with governors they were rendered independent of the pressure in the main, provided only there was pressure enough, and the taps could be turned fully on, so that every lamp would burn with a proper size of flame and no more. Having in this way turned on the tap and lighted it, by a reverse current he turned it off again. But, having devised all this, it was rather hard that Mr. Fox should be met with the discouragement that unless he could say what would be the saving when it was thoroughly perfected, they did not care to listen to him.

Mr. HALE said he did not consider that Mr. Dibley made his remarks in any carping spirit. Something of this kind was experimented upon 30 or 40 years ago. Mr. Fox could perhaps show that the very fact of being able to instantly light and put out the gas would result in a very large saving. It appeared to him that the difficulty would be to light lamps three or four miles from the gasholder, and if this could be accomplished, no doubt the invention would be successful.

Mr. BENNETT, as a member of a Vestry, would like to know how many lamps could be lighted by one battery. In his parish the lamps were placed 50 yards apart, and there were 3300 of them. It would be a great saving and a great convenience to the public if the proposed system could be carried out. They were now paying 18s. per lamp per annum for lighting, cleaning, and painting. If this method could be adopted, they could on the average save one hour's gas, or 1-12th of the whole, and as they paid about £16,000 a year for gas, it would be a considerable amount. They paid, with extras, £4 5s., £4 7s. 6d., £4 12s. 6d., and £4 14s. 6d. per lamp, because they had four Companies in their district, and each had a different price and system. By this method of lighting there would be a large saving every year, and the public would be better pleased, because it was evident that in such a system they would have an equal flame in every lamp, and he was quite sure that if this condition could be fulfilled the invention would be supported.

Mr. CHADWICK, M.P., having been connected for 20 or 30 years with the lighting of a large corporate town, had had considerable experience in the matter; he had also had an opportunity of seeing the experiments at the Fulham Gas-Works, which were very satisfactory. Although he agreed with what Mr. Bramwell had said, he could not help coming back to the point that, after all, the value of an invention lay in its practical application and in its economy. They might pass a unanimous vote of thanks to Mr. Fox for his perseverance and ingenuity, even though the invention were not an economy, and no one would refuse to join in giving so young a man encouragement, so that he might go on to further and greater achievements. Taking up the question put by the first speaker, the test after all was this—whether the invention would not only benefit the general public, but prove a saving to the pockets of the ratepayers. He had made a calculation on the figures given by Mr. Bennett, and would give the results, It appeared that in his parish they paid from £3 to £3 10s. per lamp. The time would come, he hoped, when they would have united management and united gas-works, and when the public would be the possessors of the gas and water supply, but it was not so yet. They had then to demonstrate to the Gas Companies that by the application of this invention they could, under their present contract, light the gas and turn it off at fixed times, and by so doing effect a saving. He should say that at least one hour per day could be saved on each gas-lamp in the Metropolis. What did that mean? Taking it at 1-12th of the whole, it amounted to 5s. per lamp. But then there was the expense of lighting. He had sometimes been awakened in the middle of the night, when the moon was shining brightly, to know if the gas-lamps might be turned off, and at other times, when the moon did not shine when it ought to, the gas wanted lighting unexpectedly. Now, it cost about 14s. per lamp for this attention, so that altogether there was a saving of nearly £1 per lamp. The next question was, what would it cost to effect that saving? As far as he knew, the system was comparatively inexpensive, and he believed it could be applied and maintained for something like 30s. per lamp. If so, what would it cost the parish? They could borrow the money at 4 per cent., and he believed a contract could be made by which at least one-half of the £1 per lamp would be saved. If this could be done in every large parish in England, the total saving would be enormous. He believed Mr. Fox was willing to place himself in the hands of any one who would take up the invention, and he was glad to know that there was going to be a public exhibition of it in Pall Mall, where he would publicly light and extinguish the whole of the lamps as often as the authorities might require.

Mr. STRODE asked whether during the time the lamps were in operation at the Fulham Gas-Works, the tap or valve which turned on the gas was ever found to stick. That appeared to him to be the weak point, and he should like to know what amount of force could be exerted on the lever if it did stick. He thought the continued action of the gas on the oil must tend to thicken it. He saw no other difficulty, and the saving in cost must be enormous.

Mr. PRICE thought if this invention were carried out throughout London, and as they had heard, mischievous boys, by tampering with the wires, might prevent the lighting of the gas. This would be very serious, because the whole Metropolis might be left in darkness, and to guard against it it would be necessary to keep a large staff of men ready to light the lamps in the ordinary way.

Mr. CHADWICK said it was not intended practically to carry the wires overhead, where they would be exposed to danger, but underground.

Mr. PERRY F. NURSEY said he had an opportunity of inspecting the working of this invention at Fulham at the close of last year. He went with the intention to find fault with it if he could, but the result of his observations was entirely satisfactory. Not content with that, he made many inquiries of Mr. M'Minn, the Company's Engineer, who assured him that he had watched it most carefully, and had no fault to find with it. His attention was particularly directed to the point just raised about the sticking of the valves, but these he found had given no trouble at all.

Mr. Preece thought he could at once dispose of the objections raised with regard to the difficulty of maintaining the wires in working order, and the probability of their being destroyed by naughty little boys or other mischievous persons. At the present moment there were in the streets of London 5000 miles of wire, which were carrying the thoughts and wishes of the people to all parts of the world, and the notion of any wire ever being disturbed had never entered the head of any practical telegraphist. More than that, he had just returned from visiting a country where there were as many wires overhead as there were in London underground; for, throughout the United States, in all the principal towns the telegraph wires were carried through the streets, and no one ever dreamed of the wires being damaged. More than that, there was a town called Providence, where the whole of the street lamps were lit by electricity, and the wires were carried overhead. It was there where the gas was turned on and off, as Mr. Fox had described, by pneumatic pressure, electricity being used only to light it. He had not time to go and see it, but he made several inquiries, and he found that opinion was very much in favour of the system as being economical. As to the practical difficulties, when it was considered that every morning in this country cannon were fired in Newcastle, Edinburgh, Swansea, and other places; when time-balls were dropped here, there, and everywhere; and when the Greenwich current was distributed over some 100,000 miles of wire, he did not think any telegraphist would feel the least alarm when asked to devise a system of lighting a few thousand lamps in London.

Mr. W. King, as the Engineer to the largest provincial Gas Company in the kingdom, said the subject was a very interesting one to him. He trusted that in any remarks he might make with regard to economy, he would not be considered as in any way reflecting on the skill and ingenuity of the inventor. He should greatly lament if that institution were the means of checking instead of advancing inventions, but still, as had been said, the value of every invention depended on the way in which it could be practically applied. He might also say, in reply to a remark made by Mr. Bramwell, that the town of Liverpool might claim the priority over Paris of using a pole for lighting street lamps. With regard to the lighting of lamps by electricity, the case would, of course, be ultimately considered, and there were two points to which he should have to direct Mr. Fox's attention. One was the cleansing and repairing of lamps, which would necessitate the employment of a considerable staff; and, secondly, the employment of a staff to meet contingencies which would arise from time to time.

The Chairman said he remembered, some years ago, Mr. Fox coming to him with a certain scheme, which, at that time, he considered an ideal one. He had certain notions in his head, which he put forward with a great deal of ardour. He could see there were many difficulties in his way, and he could only say to him: "My dear friend, you will have to work it out." He did not expect then to hear that night so practical a response to his recommendation, for it would be agreed by all present that, as far as the application of scientific principles and considerable mechanical skill were concerned, he had really given a very satisfactory practical answer to his recommendation. He had, of course, followed this matter as a man of science, and he had been much pleased at the clearness and soundness of the views enunciated by Mr. Fox. His employment of scientific means was perfectly judicious, and, as far as he could see, he was perfect master of the agent he was operating with. He did not think he had any reason to leave the room with the idea that the meeting had not been disposed to give every encouragement to him, for there had been no remarks made which could be construed as anything like a feeling of carping criticism. Even the gentleman who first spoke evidently did so most good-naturedly, and his views certainly had their value. It gave him great pleasure to notice the evident desire there was to encourage a young inventor, which had been evinced by the meeting. It must have been very satisfactory to Mr. Fox to hear the observations of the honourable member for Macclesfield, and those of other speakers, especially those of so able a man in practical matters as Mr. Preece. All that he had to say was that Mr. Fox had every reason to quit the room with his courage strengthened, and with a determination to proceed to a successful issue. And he trusted that as he proceeded farther and farther, he would make it more clear to the community at large that he had really struck upon a useful invention, and that by-and-by the scientific application would be justified by the economic results.

Mr. Fox, in reply, said that almost every objection raised had been answered by some kind friend. A question had been raised as to the working of a large number of lamps at a distance from the works, and he might mention that he had been able to light a large number of lamps included in a circuit having a resistance of about 300 ohms, which would represent 30 miles of ordinary telegraph wire.

The Chairman having proposed a vote of thanks to Mr. Fox,

Sir Antonio Brady, in seconding the motion, said that, as President of the Inventors Institute, he had listened with intense interest to the paper and discussion, and he was all the more interested for being a Director of a large Gas Company. They had immenses losses by reason of the imperfect way in which they had to light and put out the lamps, far more than had been assumed that night; and he was much pleased to hear that the mechanical contrivance had been so much improved since he last heard of the invention. On reading the patent, he found there were several grave objections, which now seemed to have been removed. With regard to the cutting of the wires, he did not know that it was proposed to light the whole of London by one machine, but only a certain number of lights in one district; and he could see no possible objection to that. As an old member of the Society, he should have been exceedingly sorry to hear any discouragement offered to a young inventor, and should have protested against it had it occurred.

The resolution was carried unanimously.

NEW COMPOUNDS FROM COAL GAS.

By Mr. Lewis Thompson.

Although the substances here referred to have been obtained from purified coal gas, it must not be understood that the author of these discoveries has any more serious belief in the mischievous results said to arise from sulphur in gas than he has in the witches of Hopkins or the Popish Plot of Dr. Titus Oates; on the contrary, he is not without a hope that, by the progress of real knowledge, the existing disgraceful enactments regarding coal gas will be sent to keep company with the two comparative illustrations above alluded to, and, for the sake of science, the sooner this happens the better.

It has been proved that the bisulphuret of carbon, like cyanogen, possesses a power of uniting directly with metals without the intervention of oxygen or any similar body, and hence it has received in that form a distinguishing name, "Erythrogen."

Guided by this property, an attempt was made to discover whether erythrogen could displace cyanogen from any of its combinations, and in making this attempt, it was not only discovered that cyanogen can be so displaced, but also that in so doing two hitherto unknown compounds are produced, both of which possess very remarkable qualities. The first experiment was made upon a sample of coal gas known to contain a rather large proportion of bisulphuret of carbon, and it was conducted thus: A set of Liebig bulbs were charged with a solution of caustic potash, in which a quantity of bicyanide of mercury had been previously dissolved, and the coal gas in question was then slowly passed through the bulbs with the following results:—In a very few minutes the solution became milky, and this continued to increase for several days, with the deposition of a white precipitate, which, however, by a continuance of the experiment, became first grey, then black, and at last of a beautiful scarlet colour, thus proving the existence of at least two, perhaps three, different compounds. It required a great many experiments to discover the nature of these compounds, and also a sure and certain method of making them uncombined with each other; but at length all difficulties were overcome, and the following process adopted:—Having ascertained by analysis that the scarlet compound derived nothing from the coal gas but the bisulphuret of carbon contained in it, the gas was abandoned, and pure bisulphuret of carbon employed in its stead in this manner. A strong solution of the cyanide of potassium is to be boiled for several minutes upon binoxide of mercury, or, what answers equally well, the nitric oxide of mercury, sold by apothecaries; it is then to be mixed with three times its bulk of a very strong solution of caustic potash, and when it has become cold it must be cautiously decanted into a Florence flask or other convenient vessel, and a considerable quantity of bisulphuret of carbon added to it with frequent agitation. The mixture assumes in rapid succession a variety of tints, passing from white, yellow, brown, and grey, into black, and if then left to the ordinary temperature of the atmosphere, the black is changed into scarlet in the course of 24 to 48 hours, according to the quantity of caustic potash present; the larger the amount of potash, the shorter is the time required for the development of the scarlet colour. But this change is soon brought about by the employment of heat, and, therefore, the flask containing the mixture should be placed in a water-bath having the temperature of about 110° Fahr., when in about half an hour the scarlet precipitate will have formed in the flask, and we may distil off and collect the surplus bisulphuret of carbon, after which the pigment must be well washed with hot water and carefully dried. As thus obtained, ponsœlion is a scarlet powder of a very brilliant tint, which differs from that of vermilion so slightly that the two substances are very liable to be confounded with each other, but may easily be distinguished by subliming a little of the powder in a small glass tube, when vermilion will retain its red colour, but ponsœlion sublimes and forms a jet-black mass, frequently containing numerous metallic spangles that strongly resemble metallic antimony and tellurium, although it becomes red when finely powdered. The tint of ponsœlion is, however, not so purple as that of vermilion; and a very eminent portrait painter has pronounced it "the nearest approach to the natural hue of the European countenance" that he has ever met with. We may, therefore, conclude that it will come into general use as a pigment, and hence its qualities become an interesting subject of inquiry; and it is satisfactory to find that ponsœlion rivals gold itself in respect to resisting the effect of atmospheric influences, for it is unacted on by any one of the concentrated acids, even when boiling hot; and it is only attacked, like gold, by *aqua regia* and those fluids which generate chlorine. It is, moreover, unaffected by sulphuretted hydrogen, or any of the hydrosulphurets, and, as a paint, may fairly be said to be imperishable. Its composition appears to be very peculiar, though a sufficient number of analyses has not yet been made to settle that question beyond the range of doubt. Nevertheless, it seems to consist of one atom of mercury (202), three atoms of sulphur (48), one atom of carbon (6), and one atom of hydrogen (1), thus making 257 as its atomic equivalent, and leading us to conclude that it is a hydro-erythride of the protosulphuret of mercury, from whence we may infer that it might be made by a very different process to that above described, and, indeed, we may naturally expect many improvements in the mode of its production.

For example, if we regard ponsœlion as a hydro-erythride of the protosulphuret of mercury, we might expect to form it by merely precipitating a mixed solution of the erythride and sulphuret of potassium by a solution of the protonitrate of mercury; but this experiment has not yet been tried, although, if successful, it would be a very economical mode of making the pigment.

We have seen that the first effect produced by passing coal gas through an alkaline solution of the bicyanide of mercury is to create a white precipitate, and if we arrest the process at that point we obtain, in the usual way of washing and drying, a grey-white powder, which, on the application of heat, explodes with much violence, and requires, therefore, to be examined with care. It has not yet been analyzed, and in all probability consists of two distinct substances—one containing sulphur, and the other cyanogen united to some form of hydrocarbon; it is to this last that the name "cyanon" has been provisionally given. As procured in the way described, cyanon is a white powder having a greenish-grey tint, and when a few grains of it are heated in a test-tube, it explodes at a heat of about 400° Fahr., with much force, and the production of a considerable quantity of soot or carbon, whilst the mercury is thrown out of the tube to a considerable distance, so that cyanon may truly be said to combine the qualities of both gunpowder and shot. The cyanogen compound, which in cyanon is united to mercury, has been transferred to copper with the production of a copper salt having an explosive quality quite equal to the mercurial compound, and in all likelihood this copper salt is the substance which has frequently caused explosions during the repairing of old gas-meters by soldering them. This explosive quality is, however, destroyed by the action of hydrosulphate of ammonia, and no doubt common gas liquor would answer the same end, so that it would be a wise precaution to bathe old gas-meters in gas liquor before attempting to apply a heated soldering iron to them.

To obtain cyanon, it is not necessary that there should be an excess of caustic alkali present in the liquor, for this is needed only to ensure the formation of ponsœlion; consequently, we have merely to boil a solution of the cyanide of potassium upon an excess of peroxide of mercury, and, after filtering the cold liquor, pass a current of purified coal gas through it until a sufficient quantity of white precipitate has been formed, which must then be washed and dried in the usual way.

During the above process, as well as in that by which ponsœlion is produced, there are formed acids of an unknown kind, part of which remain in the liquor combined with the potash; and it was my intention to carry out the investigation of these things to their complete elucidation, but a domestic calamity has so shaken my health that this is now impossible, and, therefore, I leave the subject unfinished.

A few words, perhaps, require to be said in explanation of the term "ponsœlion." It is derived from the ancient Roman name of Newcastle-upon-Tyne, which was Pons Ælii; and as the substance itself was first obtained out of gas made from Newcastle coals, the name can scarcely be objected to as a mere mark of distinction from vermilion, for which purpose alone it is intended.

Water Supply in the United States.—Chicago uses 52 million gallons of water daily, or 120 gallons to each inhabitant. The average waste, which in 1858 was 33 gallons daily per head, had increased to 92 gallons in 1876, and some means are needed to avoid this enormous loss.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is still only a very limited amount of business doing in this district, the demand for both coal and iron being very small, with prices low and irregular, owing to stocks being pushed on the market by needy holders who are compelled to realize.

All classes of round coal now move off very slowly, and prices are a trifle easier. The Manchester Corporation, who, during the high prices ruling a couple of years back, were in a very favourable position with regard to their contracts for gas coal, are evidently considering the advisability of again securing forward supplies at low prices, and I understand that numerous tests are now being made with various descriptions of coal, with the view of entering into contracts for long forward deliveries. Prices have certainly now reached a very low point, and although, perhaps, during the summer there may be a little further giving way, this can scarcely be to any very material extent, as there seems to be a strong feeling amongst the leading colliery proprietors to run short time, or even stop some of the pits altogether, rather than throw coal upon the market at much lower prices than they are now compelled to accept, and it is questionable whether prices are not already quite as low as would be taken for any long-running contract. Inferior classes of fuel for iron-making and steam purposes are still a drug in the market, and it is only in slack, of which there is less now being made, and for which some inquiries are coming to hand for brick-making, that there is any prospect of improvement. For sales in bulk, prices at the pit mouth may be given at about 8s. to 9s. for ordinary good Arley, 7s. 6d. to 8s. for Pemberton four-feet, 5s. 6d. to 6s. 6d. for common coal, 4s. 6d. to 5s. 3d. for burgy, and 2s. 6d. to 3s. 6d. for ordinary slack.

The coke trade is very dull, and low prices are ruling in the market.

There is no material change to notice with regard to the position of Lancashire makers of pig iron, who are still being undersold, especially by Lincolnshire and north country irons, which are offered here at very low figures. Finished iron continues very dull, and Middlesbrough bars delivered into the Lancashire district can be bought at £6, and Lancashire at £6 2s. 6d. per ton, whilst steel rails delivered into this district have been sold at as low as £6 5s. per ton.

There is every prospect of another stoppage of work in the finished iron trade, as the leading firms seem determined to enforce the reduction of 2½ per cent., which the men have resolved to resist.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England has fallen back into a dull inanimate state; when it should be reviving, as it generally does in the month of March, with the reopening of the Baltic ports, it is standing still, and in some instances it is going back. The gas collieries are doing a very ordinary business; the shipments generally are of coals which have been sold under contract. Second-class sorts, as a rule, have to make a little more allowance in discount before a market is found for them. Roundly stated, best and medium qualities of gas coals may be quoted at from 7s. to 7s. 6d.; second sorts at 6s. 6d. per ton. The best steam collieries are doing a fair trade at from 9s. 6d. to 10s. per ton. The second-class steam collieries are not well employed. Second-class steam sells at from 8s. 6d. to 9s. per ton, with a variance of from 2½ to 5 per cent. discount. There is a limited business transacted in house coals. Best house coals do not exceed 10s. per ton in price.

The coasting freight market has rarely been in a more depressed state than at the present moment. Freights are low for small sailing ships. They are quoted at 5s. 3d. per ton to discharge gas coals at the wharves in London river. The Gas Companies on the east coast seem to have as much tonnage as they can do with at present, and very few small sailing ships were chartered by them last week. There is the same sort of depression in the coal trade to France and Holland. The Gas Companies of the large cities on the eastern seaboard of the United States have ceased to import gas coals from the United Kingdom. They offer steamers no more than 4s. 6d. per ton freight, which the owners of vessels do not think worth while to take. They send their steamers out to Boston, Philadelphia, and other cities in ballast in preference. A little better trade is being transacted in gas coals with the Italian ports of the Mediterranean, but at low freights.

The iron manufacturers in the Cleveland district have been trying to restrict the make of pig iron; but they have scarcely succeeded in doing so. The iron market at Middlesbrough has been dull all the week. The shipments, by regular steamers, to the Baltic and the North of Europe never were fewer than they are this March.

Some small vessels have been engaged to load cargoes of fire-bricks for London at 6s. per ton, and Rochester 7s. 6d., and for Boulogne £7 10s. A fleet of between fifty and sixty sailing vessels reached the Tyne last week, from Norway and Sweden, laden with timber, mostly intended for mining purposes. There are somewhat heavy deliveries of lead from Spain.

The upward tendency in the chemical market was not sustained last week. Prices fell away a little.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

As may be remembered by readers of these "Notes," it was resolved by the Police Commissioners of Wishaw, a number of months ago, to acquire the local gas supply undertaking, under the provisions of the Burgh Gas Supply (Scotland) Act; but up to the present time the transference has not taken place. In reply to a communication from the Police Commissioners, the Directors of the Company have recently stated that they cannot give an answer as to the price which they may deem it advisable to ask for the works until the Shareholders are consulted on the matter.

The report by Dr. Wallace on the illuminating power of the Glasgow gas during the week ending the 16th of March shows that the lowest minimum was 25·10 candles, which was in the Partick, or western district. In no instance was the maximum higher than 27·20 candles. In the southern, or Tradeston, district there was very little variation over the whole week, the average, maximum, and minimum being respectively 25·74, 25·82, and 25·60 candles. I find that the annual report on Scotch gas statistics, just issued by the West of Scotland Association of Gas Managers, gives the average illuminating power of Glasgow gas over the year 1877 at 26·86 standard candles.

At the last meeting of the Edinburgh Town Council, Mr. J. Falconer King's report on the quality of the gas was submitted. It stated that, on Thursday, the 14th inst., the Edinburgh Gas Company's gas gave a light equal to 27·30 standard candles, while that of the Leith Company stood at 27·40 candles. Referring to the report, the Chairman said that complaints were often heard about the price of gas in Edinburgh, as compared with that in other cities. He found, however, that in Manchester the illuminating power never exceeded 17 candles, so that in Edinburgh they were in reality getting a great deal more light for the money paid.

Mr. John Tainsh, who was for a considerable period the convener of the Corporation Gas Committee at Hamilton has lately been finding fault with what he considers to be extravagance on the part of the Committee as now constituted; and, in a letter which he has just written to a local newspaper, he says that, had the gas-works been in the hands of a private Company, no such extravagance would have been thought of. He goes on to say that he now sees it to be a mistake to have such works in the hands of representatives of the public who have little of the technical knowledge required for carrying them on successfully and economically.

The Finance Sub-Committee of the Glasgow Corporation Water Committee have agreed to recommend the Water Commissioners to continue the domestic water-rate during the current year, at the amount at present charged—namely, 8d. in the pound, and 11d. in the pound as the rate for water for domestic purposes beyond the limits of compulsory supply. They also propose to continue the public water-rate at 1d. in the pound; but recommend that certain alterations be made on the rates chargeable for supplies for other than domestic purposes. By these changes, the charge for supplies by meter will be raised from £1 13s. 4d. to £1 15s. 5d. per 100,000 gallons; all consumers of water for other than domestic purposes beyond the limits of compulsory supply will be charged 1d. per pound on the full annual value of their premises, in addition to the ordinary rates. The charges for restaurants, fishmongers, eating and coffee houses, milkshops, &c., will be reduced to 8d. per pound on the full annual value of their premises; and a fixed amount (2s.) will be charged for each horse in livery stables, and for each hearth in smithies. The estimated revenue for 1878–79 is £141,611, of which £63,906 is derivable from the domestic water-rate, £11,985 from the public water-rate, £23,988 from trade charges, and £39,495 from meter supplies.

Some doubt having been thrown upon the quality of the water obtained from the Nolt Loan well, which forms the main supply for Arbroath, the Police Commissioners of that town, in order to enable them to reply satisfactorily to the letter recently received from the Board of Supervision, have just had samples of the water analyzed by Mr. William Arnot, consulting analytical chemist, Edinburgh; Dr. Redwood, London; and Dr. Wallace, city of Glasgow analyst. Mr. Arnot describes the water as of moderate hardness, quite free from organic contamination, wholesome, and fit for all domestic purposes. Dr. Redwood considers it a good, unobjectionable water for the supply of a town. Dr. Wallace says it is too hard to be used, with comfort, for washing; but as regards purity it is unobjectionable, and compares very favourably with well water generally. Dr. Wallace indicated a fear that the water might be contaminated at some future time. Dr. Anderson, local medical officer, in presenting the reports of the analysts at a meeting of the Water Committee of the Local Authority held on Friday, pointed out that means might be taken to prevent any contamination by protecting the shaft of the well. The Committee agreed simply to report the opinion of the Analysts and the Medical Officer to the Local Authority.

At the last meeting of the Glasgow Corporation Water Committee, the Engineer's report was presented, which stated that the quantity of water in store on the 11th inst. was, in lochs, 126 days supply, and, in reservoirs, 206 days supply; and that the quantity sent into the city and suburbs during the fortnight preceding averaged 33,450,000 gallons per day.

For the fortnight ending the 23rd of February, there were 477,342,849 cubic feet of water, or 136 days supply for all purposes, in the various reservoirs of the Greenock Water-Works. The supply drawn through the main-pipes to the town was 6,104,453 gallons; supply to public works by meter, 1,900,221 gallons; and the supply for domestic purposes was 4,204,232 gallons, or 57 gallons per head per day, taking the population at 74,000.

As low as 51s. 0½d. was accepted for pig iron warrants in the Glasgow market last Wednesday; but there was a slight improvement afterwards, and the market closed on Friday with buyers at 51s. 1d. cash, and 51s. 2d. one month, sellers very near. The closing price was 3d. per ton under that of the previous Friday, and makers pigs were, in several instances, 6d. per ton lower.

The coal market is in no way improved, and coalmasters find still greater difficulty in disposing of their outputs.

WINCANTON GAS COMPANY.—A Company has just been registered for the supply of gas to this town. The capital is £2345, in £10 and £2 10s. shares.

TYNEMOUTH GAS COMPANY.—The statement of accounts to be presented at the meeting to-day shows a balance of profit of £5572 0s. 1d. The Directors recommend that the statutory dividends of £10 per cent. on the ordinary stock, £7 per cent. on the £10 shares, and 2s. 10d. on the last issue, be paid, leaving a balance of £502 7s. 3d. to be carried forward. The works are reported to be in an efficient and satisfactory state.

BEVERLEY CORPORATION GAS SUPPLY.—At the meeting of the Beverley Town Council on the 11th inst., the Gas Committee recommended that as the stock of coke was increasing, the price be reduced from 12s. 4d. to 10s. per ton. The Committee had again fully considered the charge for meters, with the result that no alteration was recommended. In the estimate for a general district rate at 10d. in the pound, it was computed that the proportion of rate at 3d. in the pound, on the gas account, on £30,318, the rateable value of property assessable, would produce £378 19s. 6d.

RICHMOND (YORKS) CORPORATION GAS UNDERTAKING.—It appears from the Corporation accounts just published that the expenditure in the gas department during the past year was £2561 18s. 3d.; inclusive of wages, £314 2s. 6d.; coals, &c., £709 6s. 8d.; meters and fittings, £89 0s. 5d.; interest on £2000 borrowed money, £121 13s. 11d.; gas-mains, £323 11s. 1d.; and extension of works, £780 15s. 1d. The income was £1644 4s. 9d., which shows a deficiency of £917 13s. 6d.

CARDIFF GAS COMPANY.—The half-yearly meeting was held on the 26th ult.—Mr. G. Phillips in the chair. The report of the Directors and the accounts were adopted, and dividends at the rate of 10 per cent. per annum on the A stock, 8 per cent. on the B stock, and 7 per cent. on the paid-up capital created by the Act of 1870, were declared payable on the 25th inst. The retiring Directors and Auditor were re-elected, and the thanks of the meeting voted to Mr. H. Bowen, the Engineer, also to the Chairman and Directors, for their attention to the interests of the Company.

REDUCTIONS IN THE PRICE OF GAS.—The report of the South Metropolitan Gas Company, just issued, states that the Directors have reduced the price of gas to 3s. per 1000 feet from Christmas last. The Seaham Harbour Gas Company, Limited, announce that the price of gas from the 1st of July next will be 3s. 9d. per 1000 cubic feet, being a reduction of 5d. This is the third reduction made by them since December, 1875. The Directors of the Sheppy Gas Company in their report announce a reduction of 3d. per 1000 from the 1st of July, in the shape of discounts on promptly paid accounts.

WEYMOUTH CONSUMERS GAS COMPANY.—The half-yearly meeting was held on the 21st ult.—Mr. Damon in the chair. The Directors report stated that the result of the half year's working, together with the balance brought forward from the last half year, enabled them to recommend a dividend for the half year at the rate of 10 per cent. per annum on the original shares, and 7 per cent. per annum on the new (1875) shares, to be declared free of income-tax, and the remaining balance to be brought

forward. The report was adopted, and thanks were voted to the Chairman and Directors, and to Mr. Stone, the Manager, for their attention to, and successful management of, the business of the Company.

SEWERAGE AND WATER SUPPLY OF SHEERNESS.—The Local Board of Sheerness having applied to the Local Government Board for sanction to borrow £4000 for works of sewerage and water supply, Mr. Arnold Taylor, one of the Inspectors, held an inquiry there. The works contemplated included the provision of a better supply of water for Blue Town, the completion of the plan of drainage previously approved for that part of the town, and the carrying out of certain alterations and improvements to the sewerage system in other parts, besides covering the cost of some additional works to the new well. Some of the inhabitants of Blue Town attended, and expressed a hope that this time the improvements to their part of Sheerness would be carried out, as on a previous occasion money which was borrowed for those objects was applied to other purposes.

NEWPORT (MON.) WATER COMPANY.—The half-yearly meeting was held on the 25th ult.—Mr. S. Homfray in the chair—when the following report was received and adopted. "The statement of receipts and expenditure of the capital and revenue accounts for the half year ending the 31st of December last is sent herewith. Your Directors recommend that the guaranteed interest for the half year ending the 31st of December, on the preference shares, be paid; that a dividend of 4 per cent. for the same period upon the ordinary share capital called up be declared, and that such interest and dividend be payable on the 9th of March next; this will leave a balance of £1214 13s. 10d. to the credit of the general revenue account. In the beginning of next month your Directors have reason to believe that your Engineer, Mr. John Taylor, will certify the works at Pant-yr-eos reservoir to have been completed."

WATER POWER AT HULL.—In 1872 a company obtained parliamentary powers to pump water from the River Humber for distribution along the line of docks as a motive power for working dock gates, cranes, and other purposes. The works have recently been completed at an outlay of £17,000. Nearly a mile of 6-inch cast-iron main, 1 inch thick, with gutta-percha ring joints, has been laid, through which water is supplied at a pressure of 610 lbs. per square inch. Two pairs of high-pressure horizontal engines, of 60-horse power each, capable of pumping 130 gallons per minute at 700 lbs. per square inch, with steam at 100 lbs., have been erected. They pump into an accumulator of 18 inches diameter and 20-feet stroke, loaded with 57½ tons of copper, slag, and sand. The Company supply the high-pressure water to the Hull Docks at the rate of 4s. per 1000 gallons. The charge for working warehouse cranes is under one halfpenny per ton for a lift of 40 feet.

THE DRAINAGE OF VILLAGES.—A correspondent of *The Times* writes:—"An inquiry has been held at South Cave, Yorkshire, before Mr. Arnold Taylor, one of the Inspectors of the Local Government Board. This is a representative case, and the decision of the Local Government Board is looked for with considerable interest. The question is whether small rural villages, where the health is good and the death-rate lower than the average, are to be compulsorily drained at a large expense, contrary to the wish of the inhabitants. Here the death-rate was proved to have been under 13 per 1000 for the last four years, and the village entirely free from infectious diseases, while in the neighbouring village of Welton, which has been recently drained, there had been four deaths from typhoid fever, and a death-rate of 28 per 1000. In South Cave there are only 70 houses to be drained, the proposed outlay being £2000, involving an extra rate of 6d. in the pound."

CAMBORNE WATER COMPANY.—The half-yearly meeting was held on the 28th ult.—Mr. A. C. Willyams in the chair. The accounts showed that there had been expended to the 30th of June last £17,206; interest and expenditure on hydrant covers raised this sum to £17,405. The receipts were £10,476 from calls, and £3000 from debentures, leaving a balance of £3929. The Directors reported that the entire works retained their general efficiency, and that, during the winter, no expenses had been incurred beyond the ordinary cost of maintenance. The bottom of the reservoir continued to improve. The revenue account showed a profit on the half year of £191, and the adverse bank balance, which, at the end of June, 1877, was £161, had been paid off, leaving a balance of £24 in favour of the Company at the end of the year. They recommended a dividend of 2½ per cent. per annum. They were gratified at the present prospects of the Company, and had strong reasons for believing that a more satisfactory future was before them. On the motion that the accounts should be passed, a lengthy discussion arose as to the propriety of extending the works through Pool to Redruth, at a cost of £8000. The matter was left in the hands of the Directors.

ACKWORTH, FEATHERSTONE, PURSTON, AND SHARLSTONE GAS COMPANY.—The annual meeting was held on the 6th inst. at the Company's Office, Purston. Mr. A. Wardman, the Chairman, presided, and the other Directors present were Messrs. R. Cowling, W. Shaw, J. Waller, and A. Hurst. The Shareholders in attendance were Messrs. Walker, Lodge, Ellerton, Robinson, and Holt. Mr. Watson, the Secretary, having read the report and balance-sheet, they were adopted. The Chairman then proposed that a dividend of 2½ per cent. on the half year should declared, which, on being seconded by Mr. Ellerton, was adopted. The Chairman informed the meeting that the mains were now being laid to Ackworth, and that the whole of the shares had been taken up. The two retiring Directors, Messrs. Wardman and Hirst, were unanimously re-elected. The Auditor, Mr. Cockroft, was also reappointed. Mr. Holt suggested that the balance-sheet should be only made up yearly, but it was decided to continue to make up the accounts half yearly, as usual. A vote of thanks to the Directors and to the Chairman terminated the proceedings.

HALESOWEN GAS COMPANY.—The Directors annual report congratulates the Shareholders on the prosperity of the business, and states that they hopefully look forward to better results in the coming year, as the new works are nearly completed. Of the 1200 new shares of £5 each, the Directors regret that only 610 have been applied for. £2 10s. per share having now been paid on them, and, with the prospect of success the Company foreshadow, they hope to dispose of the 590 shares now remaining unsold, thereby enabling them to reduce the bank debt; otherwise, in a few months hence, they will be compelled to make further calls on the shares now allotted, at the rate of 10s. per share, at intervals of three months. The trade account shows a profit of £250 16s., which, with £34 6s. 10d. brought from the former year's account, makes a total of £285 2s. 10d. at the disposal of the Directors, after having paid interest, at the rate of 5 per cent., on the £1000 debenture bonds. This sum they propose to appropriate as follows:—By a dividend of 6 per cent. on the capital, £239 6s. 6d.; placed to reduction of suspense accounts, £30; carried forward to next year's accounts, £15 16s. 4d.—total, £285 2s. 10d.

POLLUTION OF THE RIVER WYE.—In the Hereford County Court, on the 12th inst., an action was brought, by Mr. John Lloyd, of Huntington Court, to compel the Corporation of Hereford, as the Urban Sanitary Authority, to abstain from polluting the Wye by causing the sewage of the city to flow into it. In the statement of particulars the plaintiff alleged that the defendants have, "at Rigg, in the township of Tupsley, in the city of Hereford, and elsewhere, committed an offence against the provisions of Part II. of the Rivers Pollution Prevention Act of 1876, by causing to fall or flow, or knowingly permitting to fall or flow, or to be carried into a certain stream called the River Wye, solid and liquid sewage matter;" and the plaintiff prayed that the Court would, "by summary order, require the defendants to abstain from the commission" of the offence, and give "such further and other relief" as to the Court "shall seem meet." The counsel representing the Corporation admitted the offence, but applied for an adjournment of six months. The plaintiff's counsel opposed the application, and urged the Court to make a formal order under the Act at once, but to suspend the operation of it for a reasonable time. The Judge (Mr. Smirke), however, declined to make the order, and agreed to the adjournment of the case for six months, on the Corporation undertaking to consider, in the meantime, the best means of abating the nuisance.

WOODHOUSE GAS SUPPLY.—On the 18th inst., a meeting of the inhabitants of Woodhouse was held to consider the price of gas supplied by the Woodhouse Gas Company, and to receive the report of a deputation appointed to wait upon the Directors. Mr. Bartholomew, one of the deputation, said the Directors had told them they were not prepared at present to make any further reduction than that proposed in the circular already issued—namely, 5d. per 1000 cubic feet. They had compared their price with those of Companies of a like character, and they found the price charged by the Woodhouse Company was very low indeed. Mr. Murfitt said the only thing that remained for them to do was to get up a requisition to the Sheffield Gas Company, asking them to extend their mains to Woodhouse. Mr. G. Markham said he should propose that they ask the Woodhouse Gas Company to supply them at 4s., and if they would not, to tell them to take the meters out. The resolution was carried unanimously. Mr. C. Taylor said he did not think the resolution was of any use, as they had the decision of the Woodhouse Directors already. He proposed that a requisition be presented to the Sheffield Gas Company to bring their mains to Woodhouse. The motion was seconded by Mr. A. Jackson, and carried unanimously, and a Committee were appointed to carry out the object of the meeting.

TROWBRIDGE WATER COMPANY.—The ordinary general meeting of Shareholders was held on the 13th ult.—Mr. S. Peed in the chair—when the Directors submitted a report recommending a dividend on the consolidated stock at the rate of 2½ per cent., payable on the 1st inst., free of income-tax. The accounts showed that the actual amount of net earnings during the past year was £672 2s., being an increase of £285 6s. 2d. over the preceding year, when the actual net amount earned, after deducting the previous balance in hand, was £387 15s. 10d. The Directors stated that the unusually wet season last year had interfered with the consumption of the water; nevertheless, the increase in the water-rental was satisfactory, and they looked with confidence to the still further development of the undertaking for the supply of the pure and wholesome water at their command. The purchase of Yarnbrook Mill had been completed, and the Company took possession on the 31st of December last. The Engineer, Mr. H. Tomlison, reported that during the past year water from the Company's works had been laid on to 215 premises, the income from 205 of these being £140 per annum. The remaining ten services were supplied through meter, and the amount derivable therefrom was indefinite. The total number of premises now supplied was 1217, and of these 66 were through meter. The general condition of the Company's works was satisfactory. At the close of the ordinary business a special general meeting was held, for the purpose of obtaining the approval of the Shareholders to the Bill now before Parliament, for extending the water supply by the Company to Westbury, Bradford-on-Avon, and Melksham.

TRURO WATER-WORKS COMPANY.—At the half-yearly meeting on the 26th ult., the Directors reported that calls had been received to the end of the year upon 136 of the 172 shares allotted. Further calls had, however, been received since the closing of the year on 35 shares, and 14 more shares had been allotted. The negotiations for acquiring the necessary land for the construction of the works had been brought to a successful termination. The purchase-money had been paid. The Contractor had duly signed his contract, and taken possession, and was now proceeding to execute the work. It had been deemed advisable, for the protection of the Company in case the works should not be completed before the expiration of the time allowed in the Act—namely, the 29th of June next—that application should be made to Parliament for an Act for the extension of the time. The report of the Engineer stated that the whole of the necessary pipes had been delivered. The site for the engine-house, &c., was being levelled, and the filter-bed was in a forward state. The engine purchased at South Carn Brea Mine had been brought to Truro, and was now under repair. The statement of accounts submitted showed receipts from a first call on 186 shares, £372; less unpaid, £100—total, £272. The purchase-money for the land was £500, thus leaving a balance due to bankers of £228. The reports and statement of accounts having been adopted, the meeting was made special, and a resolution adopted sanctioning the Bill for an extension of time.

CHESTERFIELD WATER AND GAS COMPANY.—The half-yearly meeting was held on the 27th ult.—Mr. R. T. Grattan in the chair. The accounts presented showed a balance of profit on the half-year's working of £5808. The report stated that the Northern main, which supplies in bulk and also distributes water to the whole of the district north of Chesterfield up to the boundaries of Dronfield and Coal Aston had been completed some months. The report and statement of accounts were adopted, and a dividend of £2 10s. per cent. for the half year (at the rate of 5 per cent. for the year) was declared on £49,200 preference shares and guaranteed stock; £3 10s., or 7 per cent. per annum, on £58,540 £10 shares; £15, or 30 per cent., on £11,200 ordinary stock, being 5 per cent. for the last half year and 10 per cent. in respect of deficiencies in dividends in previous years; and £5 5s., or 7 per cent. per annum, on £6914, being the deposit and first call on ordinary shares issued in 1876. Messrs. Lancaster and Burkitt were re-elected Directors, and Mr. Shaw was re-appointed Auditor. In proposing a vote of thanks to the Chairman for presiding, Mr. Pawson (Sheffield) congratulated the Shareholders on the possession of such a prosperous undertaking, and pointed out that the new works of the Company were likely to prove a great benefit to the neighbourhood. A vote of thanks to the Directors concluded the proceedings.

SHOREHAM (SUSSEX) GAS SUPPLY.—At the meeting of the Shoreham Local Board, on the 19th inst., the Committee appointed to consider the quality and the price of the gas supply of the town, recommended that the Clerk be instructed to apply to the Brighton and Hove Gas Company to supply their customers in this district at the price charged to consumers in Brighton and Hove, which was 3s. 6d. per 1000 feet. If this application were granted, the Committee were of opinion that no better arrangement could be made. If the Company declined to reduce the price to 3s. 6d., then the Committee recommended that an application be made to the Company to know the terms on which they would sell their plant, pipes, &c., in the district, so that the Board might consider the desirability of undertaking the manufacture and supply of gas on account of the ratepayers, or of encouraging the formation of a private Company for such purpose. Mr. Green, in moving the adoption of the report, observed that

the price formerly paid by the consumers was 3s. 6d. per 1000 feet. When the price of coals increased this was raised to 4s. 6d.; but, though coals were now lower, a corresponding reduction had not been made in the gas supplied to Shoreham, though the charge at Brighton and Kingston was only 3s. 6d. By the 162nd section of the Public Health Act, the Board had power to purchase the plant of the Company, or to erect, if necessary, gas-works of their own. The report was unanimously adopted, and the Clerk was directed to write to the Company in accordance therewith.

HYDRAULIC LIFTS FOR PURIFIER COVERS.—We hear that Messrs. John Abbot and Co., Hydraulic Engineers, of Gateshead and London, have recently received instructions to apply their improved hydraulic apparatus for lifting and lowering purifier covers, to 16 new purifiers, 30 feet square, now being erected by Messrs. C. and W. Walker, for The Gaslight and Coke Company, at their Beckton works. Each purifier is provided with a stop-valve, and also a special lifting and lowering valve, worked by a hand-lever. By this means one boy can, if necessary, lift six covers in less than five minutes. The pressure (700 lbs. per square inch) is obtained from a small and specially adapted accumulator, which is lifted by force-pumps, and intended to be attached to the Company's existing engine for working the scrubbers. The covers, which are lifted from the centre internally, will have a clear lift of 7 feet above the top of the lutes, and 6 feet 6 inches when resting on the catches fixed on standards, and as the purifiers are placed outside, they will act as a covering for the men when engaged in charging the apparatus. The designs of these lifts have been carried out, we understand, under the direction of Mr. J. Coates, C.E. (for many years with Sir W. G. Armstrong and Mr. T. Hawksley), and who, we presume, will superintend the erection of the apparatus on behalf of Messrs. Abbot and Co. The principle was first applied many years ago at Beckton to round purifiers by Mr. V. Wyatt, the Constructing Engineer of the Company's works at that place. Looking at the amount of manual labour saved, and the comparatively small cost of this arrangement, there seems every probability of engineers and managers of other large gas-works adopting the same plan, especially when it is borne in mind that the power can be applied to any cranes or hoists required on the works.

A RARE OPENING.—A local contemporary says: "In answer to the following advertisement, I understand a good many applications have been received:—

——— GAS COMPANY.

THE Company are in WANT of a competent PERSON as Secretary. He must thoroughly understand the keeping of accounts, and will be required to inspect the whole of the consumers' meters (a scattered district) at least once a quarter, to collect all accounts, and generally superintend the management, making and distributing of about 10 million cubic feet per annum.—Application by letter only, enclosing testimonials, &c.

The following is a copy of one:—'Sir,—I beg to offer my services for the situation vacant at your gas-works. I have just returned from Chicago, where, at the gas-works there, I was Chairman of Directors, Gas Engineer, Chief Secretary, Head Book-keeper, Cashier, Collector of Accounts, Inspector of Meters, and Chief Stoker. I found, however, that I was not quite equal to laying all the mains and repairing the meters, as the Company wished, so we parted. But I guess as your gas system ain't quite so large as that of Chicago, I might be able to throw in your gas-mains and repair your meters, to the bargain. I have an iron constitution, with a character and intellect to match. You appear to offer no salary, but as it would be a waste of time to draw a salary, and might distract my attention from the duties of the situation, I will forbear mentioning that little matter, and as my clothes are all made without pockets, I think I am just the man to suit you. The nature of my qualifications are such that I am a whole gas-works rolled up in one individual. You will thereby perceive the propriety of me writing my own testimonials, which I assure you are perfectly genuine. You say you have 10 million cubic feet of accounts to make, distribute, and collect per annum. Well, although we never reckoned our accounts in America by the cubic foot, I'll engage to do it against any Britisher in these parts, and work a spell at moon-raking occasionally besides.—Yours, &c., PERPETUAL JACK, Vulcan Villa.'"

LIVERPOOL WATER SUPPLY.—DEEP BORING AT BOOTLE.—On Monday, the 16th inst., Mr. George H. Morton, F.G.S., read a paper before the Literary and Scientific Society of Liverpool on the deep bore-hole now being sunk by the Corporation at Bootle. Having given a description of the strata already passed through, in carrying the well to its present depth of 700 feet, he made some comments on the probable result. He stated that the intention is to bore down to the depth of 1000 feet, where an impermeable stratum is said to be expected, and the object seems to be to obtain water from a source that will not interfere with the supply already obtained from the existing bore-holes, one of which is about 600 feet deep. Although the geological sequence of the strata in this neighbourhood is known, and the pebble-beds of the Bunter formation occur at the surface around the water-works at Bootle, the particular horizon of the subdivision that occurs at that place was very uncertain before the boring was commenced, and there appeared some data for supposing that it would begin so low down in the pebble-beds that the coal measures might be reached before the depth of 1000 feet had been attained. Now, however, that the rock has been penetrated to the depth of 700 feet, the exact position of the strata passed through is proved, and, though the boring has not been completed, the section was of sufficient interest to bring before the Society. In the section exhibited, Mr. Morton explained that the entire thickness of the strata is 1000 feet, and the black line down one side represented the depth of the boring—701 feet that day at noon. Near the surface there is a bed of boulder clay, which was originally covered by a bed of sand; but the latter has been disturbed by building operations. The upper 400 feet of rock is a hard red sandstone, with thin bands of red marl at intervals, similar to that seen in the yard belonging to the water-works, and in a large quarry in Hawthorne Road. At the depth of about 420 feet the strata begin to contain many quartz pebbles, and they continue numerous for about 250 feet, when they decrease in quantity, and the rock assumes much the same character as in the upper portion of the boring. In hardness and colour the whole of the rock presents a very uniform appearance, and evidently belongs to the pebble-beds from the surface down to the bottom of the bore-hole. The maximum thickness of the pebble-beds having been passed through, indications of the underlying lower Bunter may be expected, but the occurrence of any impermeable bed before the coal measures are reached is very improbable, and they are not likely to occur within the limits of 1000 feet. In conclusion, the author stated that the lower Bunter was of a soft, porous character, and that he had no doubt that a much larger supply of water would be obtained, the natural result of the great depth and width of the bore-hole, which is 26 inches in diameter.

Register of New Patents.

3855.—HUGHES, R. H., Hatton Garden, London, "*Improvements in means or apparatus employed to indicate the waste or overflow of water from cisterns and other receptacles.*" Patent dated Oct. 5, 1876.

This invention has for its object improvements in means or apparatus employed to indicate the waste or overflow of water from cisterns and other receptacles, and relates to the employment of means to indicate audibly such waste or overflow. For this purpose the waste or overflow water is conducted or directed to a water-wheel, or other rotating contrivance of any suitable construction, such, for instance, as a turbine or emission engine, and gives rotary motion thereto. This wheel or rotating contrivance is provided with projections or other suitable means to sound a bell, gong, or other audible alarm apparatus to call attention to such waste or overflow.

3863.—TURNER, D., Dalston, "*Improvements in apparatus for burning hydrocarbons for lighting and heating purposes.*" Provisional protection only obtained. Dated Oct. 6, 1876.

The object of this invention is to construct apparatus for burning hydrocarbons with safety, economy, cleanliness, and regularity of flame.

The invention primarily consists of a particular construction of burner, preferably in the form of a hollow cone or cylinder, closed at the top, which fits or is placed upon a pipe to which the oil or hydrocarbon is supplied, the cone or cylinder being pierced with any desired number of holes, in rows or otherwise, to form jets. The invention also consists in the combination of an oil reservoir, on the principle of a "bird fountain," with a burner or burners placed at such a distance therefrom that the reservoir is quite out of contact with the flame or burners.

3880.—GREEN, H., Preston, "*Improvements in coal gas scrubbers, and apparatus for distributing liquid for other purposes.*" Patent dated Oct. 7, 1876.

In this improved scrubber, the scrubbing or washing of the gas, to remove ammonia and other impurities, is effected in a vessel or chamber provided with divisions, and containing coke or other substances, arranged in tiers as usual. At the upper part of the vessel is a central vertical pipe, capable of being rotated by suitable gearing, which may be arranged with eccentric wheels to give a differential speed to the central pipe. The lower end of this pipe is provided with a branch pipe, arranged to form, in conjunction with the central pipe, a liquid trap for preventing escape of gas, and to serve also as a bracket for carrying a bearing, in which works, as a swivel, the axis of a wheel. The wheel axis carries a liquid-distributing pipe in communication, through the said axis, with the branch and central pipes. As the central pipe is rotated, it carries round with it the branch and distributing pipes, whose wheel, with its prolonged axis or swivel, is caused to rotate simultaneously, by contact of the wheel with the teeth or inner edge or periphery of a fixed annular wheel or ring. Thus the distributing pipe, whilst travelling around the central shaft, rotates also upon the swivel which constitutes its axis.

Liquid distributing apparatus, according to this invention, may be applied in other cases where it is requisite to distribute streams of liquid to meet gas or vapour, as, for example, to absorbing towers or vessels, and to towers or vessels used for the purpose of distillation.

In conjunction with this improved distributing apparatus, when used in coal-gas scrubbers, a motor is sometimes applied, somewhat resembling the case or cylinder or drum of a meter, and which is connected with the distributing apparatus, so as to drive it by the pressure of the flowing gas. This last-mentioned arrangement is more particularly designed to dispense with steam power in small gas-works.

3882.—M'KENDRICK, J., BALL, H. W., Glasgow, and WATSON, R. G., Kilmarnock, "*A new or improved fluid motor, pump, or meter, and valves and valve-gearing therefor.*" Patent dated Oct. 7, 1876.

This invention has reference to a new or improved construction of reciprocating piston engine, with from one to four double-acting cylinders and a revolving shaft, and a new or improved construction of single revolving valve for the admission and emission of the water or other fluid for the whole of the cylinders, all specially suitable as a water engine, pump, or meter, while also applicable as a steam, air or other elastic fluid motor, or as a blowing or forcing engine.

3884.—MARTIN, J. R., Shoreditch, "*Improvements in rotary pumps and engines.*" Patent dated Oct. 7, 1876.

These improvements consist in the employment or use of rings, in connection with the sliding pieces or strips forming the piston, in such manner that the friction between the piston and interior of the cylinder in rotary pumps and engines, exhausters, blowers, &c., is entirely avoided, by reason of the rings revolving with the piston slides, and not bearing on any stationary or fixed part, for the purpose of keeping the piston slides to or against the interior of the cylinder.

3894.—YOUNG, W., NEILSON, A., and YOUNG, A., Clippens, N. B., "*Improvements in the destructive distillation of bituminous substances, and in the apparatus or means employed therefor.*" Patent dated Oct. 9, 1876.

The patentees claim, first, constructing and arranging retorts for the destructive distillation of shale, coal, and other bituminous substances with their lower ends considerably contracted, and provided with a fixed box or chest, having a hole through it corresponding to the opening in the retort, and containing a sliding plate made of iron, fire-brick, or other suitable material, for closing the bottom of the retort, another sliding plate or block being also provided to close the opening from the retort into the combustion chamber, atmospheric air and the products of combustion from the chamber being excluded from the retort, whilst in operation, by a jet of steam, or by a current of permanent gas induced into the box or chest, and through the retort by steam, either mixed with the permanent gas or separately, conducted into the apparatus, or by a mechanical exhausting or pumping arrangement; and, second, retorts for the destructive distillation of shale, coal, and other bituminous substances, with a narrow or thin space, preferably of from six to twelve inches, the width of the space being dependent upon the amount of fixed carbon in the coke residue resulting from the distillation of bituminous substance, and whereby the distillation, and especially downward distillation, is hastened, and fuel economized.

3905.—WILDY, W. L., Martin's Lane, London, "*Improvements in cocks or valves for gas-fittings.*" Provisional protection only obtained. Dated Oct. 10, 1876.

This invention relates to improvements in cocks or valves for gas-fittings, and consists in placing in an elbow, swivel, branch, or any convenient place in a gas bracket, gaselier or pendant, or in the pipe leading to the burners, a suitably constructed plug or tap, bored for the passage of gas, and around which, in the line of the gas way, there is a shallow groove, only large enough for a minimum quantity of gas to pass. By turning the plug, the gas flame is either raised or lowered, according to the position of the gas way, but in no case is it possible to extinguish the gas.

3914.—AHRBECKER, H. C., Stamford Street, London, "*Improvements in fluid-meters.*" Patent dated Oct. 10, 1876.

According to this invention, a hollow cylinder is constructed, capable of rotating on supports in the line of its axis, and containing one or more helical or screw blades, which are fixed both to the sides of the tube and to the centre spindle thereof, thus forming one or more helical passages between the blades. The tube is placed in a cylindrical chamber, and is open at both ends, fitting with its one end closely against a plate closing the one end of the chamber. In this plate are formed a number of oblique

holes, sloping in a contrary direction to the inclination of the screw blades, and adjustable in area by a rotatable plate with corresponding holes. The fluid to be measured being made to enter through these holes, impinges in oblique jets upon the screw blades, and then flows through the helical passages, whereby rotary motion will be imparted to the tube, and this motion is conveyed by a worm on its spindle to the registering mechanism in any known manner.

3916.—SHAND, J., Upper Ground Street, "*Improvements in hydrants or fire-cocks, and an auxiliary valve in connection with the same.*" Patent dated Oct. 10, 1876.

This invention relates to an improved construction and arrangement of hydrants or fire-cocks, and has for its object the means of effectually preventing hydrants from being damaged by frost, and the inconvenience and danger of having water mains and branches shut off for effecting repairs. For the purpose of carrying out the invention, a sluice-valve is used with the sliding-valve formed hollow, to allow of the actuating screw being inside it. At the lower part of the sliding-valve is a projection with a T-slot in it. In this slot is fitted loosely the top end of a small gun-metal plunger, which is moved up and down by the sliding-valve. In the centre, and below the sliding-valve, a cylinder is formed on the sluice-valve case, and bored out accurately in a line with the actuating screw. The plunger is fitted to this cylinder, and in a certain part a hole is drilled through its diameter. A corresponding hole is drilled through the cylinder, and opens a communication to the interior of the hydrant, the sliding-valve being then in a position to shut off the water. When the apparatus is in this position, the whole of the water remaining in the hydrant outlets escapes; but on the sliding-valve being screwed up to admit the water through the hydrant, the plunger rises with the sliding-valve, and closes the opening in the cylinder, thus preventing any escape while the sliding-valve of the hydrant is being opened. The plunger may be packed with hydraulic leathers or hemp to prevent leakage, but preference is given to a hollow plunger made a good fit to the cylinder.

3939.—BARNES, J., Accrington, "*Improvements in water or other fluid-meters or motors.*" Patent dated Oct. 12, 1876.

This invention consists in a new arrangement of parts composing a meter for the measurement of fluids, applicable also as a motor. Four cylinders or boxes are placed round a central crank-shaft. One pair of cylinders face each other on opposite sides of the shaft, the other pair are similarly arranged at right angles to the first pair. The axes of all the cylinders are preferably in the same vertical plane, or nearly so; each cylinder has a piston, and each pair of opposite pistons is rigidly connected together by a rod, on which (and forming an integral part of it) is a link with a long transverse slot. In this slot the crank-pin, or a journal round the crank-pin, works, the two piston-rods and links being so arranged as to pass each other, and actuate the same crank-pin at right angles to each other. The end nearest the crank-shaft of each cylinder is open, the other end closed, but provided with a port leading to a central valve forming a part of the crank-shaft, or securely fastened thereto, and rotating with it on a circular valve-face, with four induction ports in a ring, and a central port in and below the valve forming the discharge orifice. The whole is enclosed in a casing.

3940.—BROOK, E., and WILSON, A., Middlesbrough-on-Tees, "*Improvements in apparatus for making gas.*" Patent dated Oct. 12, 1876.

According to this invention the apparatus consists of a cupola-shaped furnace, which may be either square or round in cross section. Vertically it may be described as consisting of two sections or parts—viz., an upper retort and a lower combustion chamber, and it is an essential feature of the invention that the gas is taken off at the point where the two meet.

The upper retort is of the form of an inverted cone or frustum of a pyramid, and it is furnished with a hopper at the top, through which the fuel is fed. The lower combustion chamber has a solid hearth, on which the ashes are allowed to accumulate, and a little above the hearth are a series of tuyeres or openings through which the air required for combustion is forced, by means of a steam jet or a blower of any description, and it is furnished with a door at the bottom, for the removal of the ashes from time to time.

At the point where the retort and the combustion chamber meet, there are a series of lateral openings slanting upwards, and leading to a space or channel which surrounds, or partly surrounds, the retort; through these openings the generated gas passes, and it is taken off for use at any part of the channel.

3958.—WOLSTENHOLME, J., Radcliffe Bridge, "*Improvements in steam-pumps or pumping-engines.*" Provisional protection only obtained. Dated Oct. 13, 1876.

This invention relates to the description of pumps which have steam-valves controlled without the aid of revolving shafts, and consists of arrangements for effecting the movements of these valves.

3965.—STEEL, J., Glasgow, "*New or improved apparatus for purifying and condensing gas, and for extracting and collecting ammonia therefrom.*" Patent dated Oct. 13, 1876.

The apparatus, as constructed according to this invention, consists of long cylindrical vessels of boiler plate or other plates, rivetted or bolted together, and having closed ends. These vessels are carried on two, three, or more sets of rollers, so that as power is applied to drive the rollers the cylindrical vessels are slowly rotated. The vessels are divided internally all round, by means of longitudinal and transverse partitions, into a continuous series of receptacles, which have the effect, whilst the vessels rotate, of partly lifting up the water, lime water, or other condensing or purifying liquid or substance with which the vessels are charged, and, by thus regulating the charge, to move gradually through the vessel, discharging it after it has been carried some distance upwards, at the same time preventing the lime water or other purifying liquid from passing, except at a very slow rate, from the admission towards the discharge end of the cylindrical vessels.

A series of long narrow troughs or dippers also extend from end to end of the cylindrical vessels, and these also carry brushwood or wire projecting towards the centre of the apparatus, so that when the water, lime water, or other condensing or purifying liquid, lifted by the successive troughs or dippers as the vessels rotate, has been carried to the desired height, it is upset over the brushwood or wires, or allowed to fall in a shower, thereby exposing a very extended surface to act upon the gas passing through the condenser or purifier.

The extent of surface kept in a wet state by the water or lime water may also be further increased by placing at intervals transverse divisions, alternately having a passage for the gas at the centre and the circumference. These divisions dipping partly into the lime water, or other purifying liquid in the lower part of the rotating condenser or purifier, as well as by the continuous trickle of the liquid from the brushwood or wires, are kept constantly moist, and by virtue of the openings for the passage of the gas being alternately at the centre and circumference, the gas is caused to be more thoroughly mixed. Gland joints are provided at the axis of the cylindrical vessels, both at the ingress and egress ends, for the inflow and outflow of the gas; and this, not having to pass through a column of water, as in other purifiers, may be sent through it at a lower pressure.

The arrangement which is above described may be reversed—that is to say, the outer cylindrical vessel may be kept stationary, and a shaft passed through it capable of being rotated. Upon this shaft the troughs or dippers, transverse divisions, as well as the brushwood or wire, are carried, and as it is rotated these agitate and lift up the liquid after the manner before described with reference to the rotating vessel.

This new or improved form of apparatus applies both to condensers, ammonia collectors, and purifiers; but another form of condenser consists of a circular vessel of boiler plate, over which a shower of water may be let fall, or which may rotate in a trough of water or other refrigerating liquid at its lower part, so that a continuous cooling and condensing effect is obtained by the constant evaporation of moisture from that portion of the surface of the vessel which is exposed to the action of the atmosphere. The current of water through the trough passing in the opposite direction to that of the gas through the condensing vessel, the interior of the condensing vessel may have a shaft with arms passing through it for the purpose of revolving and mixing the contents.

This apparatus may be used in two ways—that is to say, in the first place the first vessel, constructed after either of the arrangements described, may serve the double purpose of a condenser and ammonia collector, after which the uncondensed portion of the gas is passed on to another vessel or vessels of similar construction, containing the purifying liquid or pulverized purifying substance. Under a second mode of applying the apparatus, it may be divided into three principal sets or divisions—that is to say, one set or division for condensing the gas, a second set or division for purifying it, and a third set or division for collecting the ammonia.

4002.—PENNING, J. R., Landport, "*Improvements in apparatus for indicating the pressure of elastic or non-elastic fluids.*" Provisional protection only obtained. Dated Oct. 17, 1876.

In carrying out this invention there is attached to the aperture through which the steam, air, or other fluid is admitted to the pressure-gauge, a cock fitted with a plug, operated by a handle in the usual way. The cock has two openings opposite, and in a line with each other, to one of which the pressure-gauge is screwed or connected, whilst the other is connected to a pipe through which the fluid, the pressure of which is to be indicated, is supplied. The plug of the cock has a straight hole through it, which opens a communication through the cock when the handle is in a line with the latter. Through the plug, a second hole is made from one side at right angles to the first, but only half way through the plug, so as to communicate with the hole first described, and a corresponding hole is made in one of the sides of the cock at right angles to its length.

4014.—HOWARD, J., Peckham, WILSON, A. F., and KINGDON, H. W. A., Southwark, "*Improvements in apparatus for controlling and arresting the flow of fluids and prevention of waste of water.*" Provisional protection only obtained. Dated Oct. 18, 1876.

A cylinder of any suitable material, such as brass, is fitted with a piston, the top and bottom of which may be fitted with cup leathers, or packed so as to fit the cylinder. This piston has a hole through it, and is attached to an actuating piston-rod, furnished at the top with a ring or other fitting. The bottom of the cylinder is closed by a metal disc, which extends beyond the cylinder as a flange, upon which a ring of metal or other material can rest as a weight. To the under side of this disc is attached a leather or other washer by means of a screw, which may be lengthened, so as to act as a guide to the weighted cylinder in its descent upon the seating of the valve or water way. The top of the cylinder is closed by a cap, through which the actuating piston-rod passes. The piston-rod is weighted, so that when released it will pass back to the bottom of the cylinder, displacing the fluid beneath, which will pass through it to its upper side.

4015.—REYNOLDS, E., Sheffield, "*Improvements in centrifugal pumps and fans.*" Patent dated Oct. 18, 1876.

This invention relates to pumps and fans acting by centrifugal force; *i.e.*, wherein a series of blades or vanes, being made to revolve round an axis, draw fluid in at the central part of the apparatus, and eject it at the circumference, thus producing a stream in the channel to which the central orifice of the apparatus is applied. For this purpose the apparatus is constructed somewhat in the form of that kind of turbine known as the Fournigron turbine, providing an inner series of fixed curved blades which act as guides to direct the fluid towards another series of blades that revolve outside and around the former. The fluid being thus drawn in through a circular aperture on one side of the apparatus, and being ejected at the circumference, the channel containing the fixed guides is made of a conoidal form, having a curvature such that the change of direction in the movement of the fluid is rendered easy. The fixed guides within this conoidal channel have such a curvature that as they recede from the axis they are directed more and more in the direction in which the outer vanes revolve, thus guiding the fluid from a radial towards a tangential direction before it reaches the latter.

4036.—VANDENDRIESCHE, A. E., George Yard, London, "*An improved gas-regulator designed for the purpose of being applied to burners of every description, without altering the original appearance of the fittings.*" A communication. Patent dated Oct. 19, 1876.

This invention consists of a small apparatus, which is introduced into the gas-pipes at any part; it is invisible from the outside, and, consequently, can be applied to any kind of burner, as it does not in any way alter the appearance of the fittings, nor raise the burner above its original position, as is the case with most regulators.

The regulator is made according to the size required by the inside diameter of the gas-pipe for which it is intended. It is composed of two pieces fitting into each other. The outer piece is hollow, and at one end is partially closed, leaving only an opening at the bottom. The inner piece, screwed inside, is pointed at its end; it is also hollow, but not throughout, the cavity communicating with the hollow portion of the outer piece through an opening cut on the side. The point at the end of the inner piece fits in the hole at the lower part of the outer piece, partially closing it. It is evident that the more the inner piece is screwed down into the outer piece the smaller does the opening become, the greater is the friction, and the less gas passes through the aperture; the quantity of gas consumed may thus be regulated as desired.

4070.—ALLEYS, Glasgow, "*Improvements in and connected with sluice and other valves, and in machine tools for making them.*" Provisional protection only obtained. Dated Oct. 21, 1876.

This invention comprises various improvements in the constructive details of sluice and other valves, and of accessory parts, and in machine tools for making the valves.

4085.—SIEVIER, J. C. H., Holloway, "*Improvements in the manufacture of gas, and in the apparatus to be employed therein.*" Application dated Oct. 23, 1876. [Void by reason of the patentee having neglected to file a specification in pursuance of the conditions of the letters patent.]

This invention relates to certain improvements in the manufacture of gas, and in the apparatus to be employed therein. The first and chief feature of it is to dispense with the present necessity of excessive heat in the retorts, and to effect the decomposition, distillation, and elimination of

the constituent elements without destructive distillation, the principle being to work *in vacuo*.

4087.—KING, J. T., Liverpool, "*Improvements in chandeliers, brackets, and bracket arms, and in apparatus employed in the manufacture of the same.*" A communication. Patent dated Oct. 23, 1876.

By these improvements, as applied to gas-burning chandeliers and brackets, metallic gas-pipe or tubing is employed for conducting the gas to the burners, and these metallic pipes or tubes are encased, on such of their sides as are exposed to observation, with pressed glass tubes on the vertical pipes, and with U-shaped or open-sided pressed glass trimmings on the laterally projecting metallic bracket pipes, and these are so attached to the metallic pipe that the latter will support the trimmings and casings so attached.

4089.—BALCON, W., Kingsland, "*An improved lamp-lighter.*" Provisional protection only obtained. Dated Oct. 23, 1876.

The body of this apparatus consists of a light metal receptacle for oil or spirit, and has at the foot thereof a screw or other means for attachment to a stick or rod. The upper end of the receptacle terminates in a tube for a cotton or wick, and at the lower part is an aperture tapped for the reception of a screw plug. To the tube at the head of the receptacle a hood or screen is applied or slipped thereon, open on one side, and serving to screen the light. In charging the lighter, the wick is fed through the aperture at the lower end, and passes out through the wick-tube at the upper end; the receptacle is then charged with the oil or spirit, and the screw plug is turned into its place to close the receptacle.

4095.—BURDEN, G. T., Birmingham, and NOWELL, J., Aston, "*Improvements in meters for measuring water and other liquids.*" Provisional protection only obtained. Dated Oct. 23, 1876.

The body of a meter constructed according to this invention consists of a conical case or chamber, the inlet-pipe for the water or liquid being connected to the wide end, and the outlet-pipe to the narrow end of the conical case or chamber. In the axis of this conical case or chamber an Archimedean screw, or a screw consisting of a series of inclined blades, is situated. This screw is conical, following the general conical figure of the case. The blades of the conical screw fit as closely against the sides of the conical case as is compatible with perfect freedom of motion in the screw, or the screw may work in a case fixed inside the meter-case. The shaft of the screw is mounted on the axis of the case upon centres, so that the screw may rotate with little frictional resistance, the centres taking into seats or recesses in the ends of the screw-shaft. These centres are carried by cross pieces or bars on the case, and are screwed and capable of adjustment in screw-boxes in the cross pieces or bars. The water or liquid to be measured enters the case or chamber of the meter by the inlet-pipe at its wide end, and the current, by striking against the blades of the screw in the case, gives a rotatory motion to the screw. The current of water or liquid, after it has thus acted upon and given rotation to the screw, escapes from the meter by the outlet-pipe at the narrow end of the case.

4106.—LEONI, S., St. Paul Street, New North Road, "*Improvements in the construction of boilers to be heated by gas.*" Patent dated Oct. 24, 1876.

This invention consists in the construction of boilers for the production of hot water and steam, composed of a number of separate steam-tight tanks or chambers, connected together by communicating pipes, and enclosed within an outer casing, heat being applied by gas to the under surface of the lowest set of tanks or chambers, and acting through them on the upper tanks or chambers by means of their communications.

Each separate tank or chamber is furnished with a man-hole, by means of which it can be cleaned out as required. By constructing boilers in this manner, a considerable increase of heating surface is obtained, with great facility for keeping them clean, and, thereby, preventing incrustation when in use; large quantities of hot water can be produced with a comparatively small expenditure of gas, and such boilers are not liable to get out of order. These boilers, when intended to be used for supplying steam to an engine, are fitted with a steam-chest for the purpose, which can also be used to supply steam for ordinary household or kitchen use. A hot closet or a griller may also be fitted over the boiler if required, such griller being heated by an atmospheric gas-ring.

4109.—WALKER, J., Glasgow, "*An improved fluid-meter.*" Patent dated Oct. 24, 1876.

This apparatus comprises a cylinder mounted on a journal or bearing so as to oscillate to a limited extent. An external catch, engaging with a snug formed on the cylinder cover, holds one end elevated until the pressure of the water forces a piston in the cylinder from the lower up to the raised end, whereupon the piston, which has no rod attached to it, causes a pin, passing through a nipple in the cylinder cover, to release the catch, and so allow the cylinder to be tilted by the weight of the piston. A similar contrivance at the other end of the cylinder then operates, and holds the cylinder in its reversely inclined position until the piston returns and liberates the catch. Water or other fluid to be measured is led into the cylinder through ports formed in the journal, and communicating with the cylinder passages; outlet ports being also provided in the journal. A pawl attached to any convenient part of the cylinder acts on a train of ordinary counting gear.

APPLICATIONS FOR LETTERS PATENT.

1032.—WEBSTER, G. E., Nottingham, "Improvements in gas-burners and their accessories." March 15, 1878.

1033.—LAKE, W. R., Southampton Buildings, London, "Improvements in furnaces applicable for heating steam-boilers and gas-retorts, and for other like purposes." A communication. March 15, 1878.

1077.—WALLER, G., and COLYER, F., Southwark, London, "Improvements in apparatus used in the manufacture of gas." March 19, 1878.

1092.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in fluid-meters." A communication. (Complete specification.) March 19, 1878.

1094.—STOCKMAN, B. P., Westminster, "Improvements in and relating to apparatus for utilizing mineral oils for lighting purposes. March 19, 1878.

1096.—LAKE, W. R., Southampton Buildings, London, "Improved apparatus to be connected with the stopcocks of gas-pipes for opening and closing the same." A communication. March 19, 1878.

1105.—LAKE, W. R., Southampton Buildings, London, "Improvements in water-meters." A communication. March 20, 1878.

1109.—COUGNET, J., and POTEL, A. P., Brussels, Belgium, "New or improved apparatus for injecting, exhausting, and forcing fluids, which apparatus is also applicable for other purposes." March 20, 1878.

1135.—GOODFELLOW, G. B., Hyde, Chester, "Improvements in the construction of pistons and pump buckets." March 21, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3603.—ADAMS, G. A., Peel, Isle of Man, "An improved meter for taps or other similar articles." Sept. 26, 1877.

3876.—PITT, S., Sutton, Surrey, "Improvements in producing, purifying, and regulating gas, and in apparatus employed therein." A communication. Oct. 19, 1877.

4309.—ROBERTSON, S., Old Broad Street, London, "Improvements in slide valves and cocks." Nov. 17, 1877.

216.—WRIGHT, F., Westminster, "An improved governor for gas-burners." Jan. 17, 1878.

219.—GRADDON, J., Clapham, London, "Improvements in machinery for pumping or forcing fluids for motive power or other purposes." Jan. 17, 1878.

PATENTS WHICH HAVE BECOME VOID.

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

286.—COBY, E., "Improvements in motive-power engines, also applicable to pumps or measures for air, gases, or liquids." Jan. 25, 1875.

360.—LAMBERT, C., "Improvements in filters or apparatus intended chiefly to clear rain water during its flow from roofs to reservoirs." Jan. 30, 1875.

399.—RYDILL, G., "Improvements in the process of and apparatus for treating and purifying sewage and polluted waters, which improvements are applicable for collecting the soap, grease and oils for the manufacture of gas, and for removing incrustation in steam-boilers." Feb. 3, 1875.

400.—JOHNSON, R., "Improvements in machinery for obtaining motive power for raising, forcing, and exhausting fluids and liquids, and for measuring liquids." Feb. 3, 1875.

417.—CHAMEROY, E. A., "Improvements in cocks for water, steam, air, or gases." Feb. 4, 1875.

425.—CROMBIE, E. E., "Improvements in dry gas-meters." Feb. 4, 1875.

439.—WIRTH, F., "Improvements in valves." Feb. 5, 1875.

442.—STUART, C., "Improvements in stop valves and taps." Feb. 5, 1875.

558.—OUTERSON, J. and A., "An improved filter." Feb. 16, 1875.

573.—HALLSWORTH, S., and BAILES, R., "Improvements in the method or means employed in treating and clarifying sewage or other impure waters." Feb. 17, 1875.

590.—PEACOCK, J. C., and RUDKIN, T., "Improvements in apparatus for cooking and boiling by means of gas." Feb. 18, 1875.

623.—SPEIR, R., and MATHER, J., "Improvements in the manufacture or production of gas for illuminating or heating purposes, and for actuating gas-engines." Feb. 20, 1875.

660.—BATES, G., "Improvements in apparatus for attaching main-cocks, valves, plugs, or other connections, to service-pipes for water when under pressure." Feb. 23, 1875.

668.—NEUHAUS, M., "Improved means and appliances for the production of lighting and heating gas from air and spirituous vapour combined." Feb. 23, 1875.

696.—QUICK, J., jun., and RESTLER, J. W., "Improvements in meters for measuring liquids." Feb. 25, 1875.

715.—TROTMAN, S., "Improvements in the mode and means of generating and inflaming gaseous vapour in lamps or other apparatus containing petroleum spirit or other hydrocarbon fluid or highly volatile oils." Feb. 26, 1875.

724.—REYNOLDS, O., "Improvements in apparatus for obtaining motive power from fluids, and also for raising or forcing fluids." Feb. 27, 1875.

744.—DICKSON, J. F., "Improvements in air and gas engines or motors." March 1, 1875.

761.—LAKE, W. R., "Improvements in apparatus for regulating the flow of gas, steam, or air." March 2, 1875.

770.—CLARK, A. M., "Improvements in gas-meters." March 2, 1875.

786.—SUGG, W. T., "Improvements in lamp-burners." March 3, 1875.

797.—ELBOROUGH, C. M., "An improved meter for liquids." March 4, 1875.

812.—CLARK, A. M., "Improvements in pumps." March 4, 1875.

826.—JOHNSON, J. H., "Improvements in traps or apparatus for separating liquids from vapours or gaseous fluids." March 5, 1875.

833.—FARNSWORTH, S., "Improvements in valve apparatus for controlling the passage of water or other fluids." March 6, 1875.

839.—COOKE, J., "Improvements in the construction of rotary engines and pumps." March 6, 1875.

902.—CAREY, R., and PORTER, R., "Improvements in valves for regulating the flow or discharge of gas, water, and other fluids." March 11, 1875.

PATENTS WHICH HAVE BECOME VOID.

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

426.—POCOCK, A. W., "Improvements in liquid-meters." Feb. 17, 1871.

443.—EVELEIGH, G., "Improvements in the manufacture and purification of gas, and in certain parts of the apparatus employed therein." Feb. 21, 1871.

469.—TELLING, W. A., and JOHNSON, S., "Improvements in the construction of dry gas-meters." Feb. 22, 1871.

474.—HEYWORTH, R., "Improvements in apparatus for supplying water to wash-basins, and for flushing waterclosets and urinals." Feb. 23, 1871.

543.—COMMON, A. A., "A new or improved automatic apparatus for opening and closing cocks, taps, or valves." March 1, 1871.

556.—BANNEHR, J., and MATTHEWS, H., "Improvements in treating coal for the manufacture of gas and fuel therefrom." March 2, 1871.

TO GAS ENGINEERS.

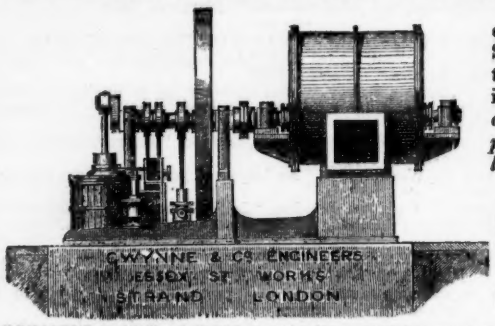
D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS, BONNINGTON, EDINBURGH.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

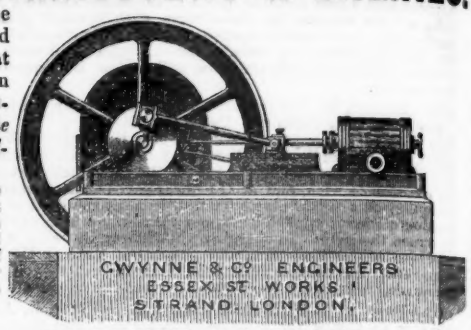
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



32,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

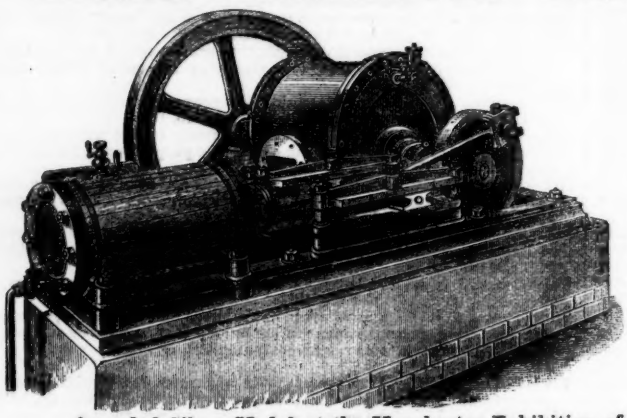
Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS

WITH

Wrought-Iron Spindles and

ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

WANTED, a good Stoker. Constant employment for a steady man. Wages 30s. per week. Also employment for a strong Youth.
Apply to ROBERT LITTLE, Gas Manager, Sittingbourne, KENT.

WANTED, by an experienced Man, a situation as Working MANAGER of a Gas-Works. Aged 40. Good testimonials and references.
Address No. 443, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Gas-Works in Lancashire, a thoroughly practical MANAGER. Salary about £100 per annum, with house, coals, &c. Present make of gas 12 million feet.
Applications, with copies of testimonials, to be sent to Z, 22 and 24, Tarleton Street, LIVERPOOL.

WANTED, a situation as Manager or Assistant Manager of a Gas-Works. Has a thorough practical knowledge of the Manufacture and Distribution of Gas, also the Manufacture of Sulphate of Ammonia. Good references.
Apply, by letter, to No. 440, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS-WORKS MANAGERS.

WANTED immediately, a Working MANAGER for a small Gas-Works in the West of England. Applicants to send copies only of testimonials, and all must have held similar positions. Wages 23s. per week with house and coal free.
Address No. 444, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Manager of a Gas-Works, where the make of gas is upwards of 100,000,000 cubic feet, or as ASSISTANT in a large Works. Thoroughly understands the erection of works, also the manufacture and distribution of Gas in all its branches. Good references.
Apply, by letter, to No. 447, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

Now ready, price One Shilling, No. 16 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE

OF THE

Manufacture and Distribution

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COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas; on Burners," &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

TO GAS COMPANIES.

WANTED, by the Advertiser, an appointment as MANAGER, or Manager and Secretary. Twenty-three years practical experience in the manufacture, purification, and distribution of Gas. Is both active and energetic. Aged 37. No objection to go abroad. Excellent testimonials and satisfactory references given.
Address X. Y., care of Mr. Bately, 16, Craven Street, Strand, LONDON.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

RE-ENGAGEMENT Wanted (home or abroad), as Draughtsman, Surveyor, or Clerk of Works. Several years experience with large Midland firms, manufacturing Bridges, Roofs, Gas Apparatus, &c. Moderate salary.
Address V. HUGHES, Ruiton, DUDLEY.

YOUNG Man, a Foreman Lamplighter, requires a situation as above. Understands Painting and Glazing Lamps. Willing to make himself useful as Foreman or otherwise, or in any place of trust. Good references.
Address, F. BLOOMFIELD, 21, Chilton Street, Lower Road, ROTHERHITHE.

APPOINTMENT Wanted, by a young man (22), as ASSISTANT MANAGER or UNDER FOREMAN in a Gas-Work, where Advertiser would have an opportunity of perfecting himself in Gas-Works Management. First-class testimonials.
Address, No. 445, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.
Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

GASHOLDER, now at work, and in good condition, FOR SALE; 45 ft. diameter, 18 ft. deep; Six Columns and Girders, with Chains and Balance-weights.
Apply to the Horseley Company, Limited, Tipton, STAFFORDSHIRE.

FOR SALE, cheap, owing to extension, Three Second-hand PURIFIERS, with Valves and Connections complete. All in perfect order.
Apply to the GAS COMPANY, NORTHALLERTON.

FOR SALE—Four Purifiers, 9 ft. by 6 ft., with Centre-Valve, 6-in. Connections. Also Four Tiers of Wood Sieves, all in good working order, the removal of which is required for extensions.
Apply to Mr. EDWARD LISTER, Gas-Works, Yeadon, near LEEDS.

FOR SALE—A Station-Meter, made by Laidlaw and Son, Glasgow, with Eight-day Clock, Tell-tale, Water-level, Pressure-gauge, Hydraulic Valves, and Bye-pass, in square case; size 6 ft. 3 in. by 6 ft. 3 in. Of a neat pattern, in good working order. Able to pass 8000 feet per hour. Parted with in consequence of being replaced by a larger one.
Apply to P. WATSON, Gas-Works, STIRLING.

GASHOLDERS for Sale, sufficient for 10,000 cubic feet make of Gas, with Columns, Chains, Weights, and Girders. In good condition, and can be easily taken out of tank. Well adapted for a small county town or gentleman's mansion. Will be sold cheap to make room for extensions.
For further particulars, apply to the Spennymoor and Tudhoe Gas Company, SPENNYMOOR.

INVESTMENT, with option of Partnership, in a sound Manufacturing Business connected with the Manure Trade and Gas Companies. £2500 to £5000 can be invested in a business already yielding a safe income, the money being required for the extension and development of a branch. Certain to yield a large fortune in a few years.
Apply, by letter only, to No. 445, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WATER PIPES.

THE following Pipes, coated with Dr. Smith's Composition, and proved to 500 feet head of water, are ready for immediate delivery:—

Internal diameter	3	4	5	6	8	9	in.
Weight per pipe, 9 ft. long	10	12	20	22	33	42	cwts.
Number of pipes	1150	850	400	600	250	35	

Address for lowest price to the MANAGER, Milton Iron-Works, WEST HARTLEPOOL.

BOROUGH OF OLDHAM.

TO IRONFOUNDERS.

THE Gas-Works Committee are prepared to receive TENDERS for supplying and fixing a Set of PURIFIERS, 19 feet square, required at their Higginshaw Gas Station.
Plans and specifications can be seen on application to Mr. Herbert Andrew, Gas and Water Offices, Oldham.
Tenders to be sent in on or before Tuesday, April 9, 1878.
By order,
H. BOOTH, Town Clerk.
Oldham, March 19, 1878.

GAS-MAINS WANTED.

THE Directors of the Eastbourne Gas Company are prepared to receive TENDERS for Cast-iron Spigot and Socket PIPES at per ton, also for CONNECTIONS at per cwt., delivered free on truck at Eastbourne Railway Station, as under:—

				c.	qr.	lb.	
20 tons of 3-in. bore, 9-ft. lengths, at				0	3	14	per length.
20	"	4-in.	"	1	1	14	"
40	"	6-in.	"	2	1	14	"
76	"	8-in.	"	3	1	14	"
38	"	10-in.	"	4	2	0	"
134	"	12-in.	"	6	0	0	"
495	"	18-in.	"	11	1	0	"

The Pipes to be cast vertically, and tested by the Contractor (at his Works or at Eastbourne, as may be decided by the Engineer to the Company), by hydraulic pressure to 100 feet head of water.
The above quantities may be varied as found necessary.
Tenders to be sent in, on or before the 28th day of March, 1878, addressed to the undersigned, and endorsed "Tender for Pipes."
The Directors do not bind themselves to accept the lowest or any tender.
J. H. CAMPION COLES, Secretary.
Eastbourne Gas Company, Eastbourne, Sussex.

TO COAL MERCHANTS.

THE Directors of the Horsham Gas Company, Limited, in Sussex, invite TENDERS for a supply of COALS for One year, commencing May 1, 1878.
The description to be either Pelaw Main or New Peltons.
The quantity required will be from 150 to 250 Tons per month, as may be ordered, but it is probable that none will be required during the months of June and December.
The Coals to be delivered at the Horsham Railway Station, carriage paid, and those received in each month to be paid for during the following month.
Sealed tenders, endorsed "Tender for Coals," to be sent to the undersigned on or before Saturday, April 6.
ROBERT SHEPPARD, Secretary.

BOROUGH OF DUMFRIES.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the supply of from 1000 to 4000 Tons of CANNEL COALS, for One year, commencing from the 15th of May, 1878, and to be delivered at Dumfries station, carriage paid, in such quantities as may be required by the Manager.
Analysis of Coals to be forwarded along with tender.
Payment will be made quarterly.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
WM. MARTIN, Town Clerk.
Town-Hall, Dumfries, March 21, 1878.

RICHMOND URBAN SANITARY AUTHORITY.

COALS.

THE Water Supply Committee of the Richmond Vestry are prepared to receive TENDERS for the supply of COALS to the Water-Works of the Vestry for one year from the 25th inst.—viz., about 400 tons of Welsh Steam Coal (Merthyr) to be delivered alongside the Water-Works Wharf at Richmond, in eight lots of 50 tons each as and when required. The Coal to be of the best quality of the kind.
The Vestry will not be bound to accept the lowest or any tender.
Sealed tenders to be sent in to me at my Office as under on or before the 1st day of April next, marked "Tender for Coals."
F. B. SENIOR, Vestry Clerk.
1, Hill Rise, Richmond, Surrey, March 22, 1878.

TENDERS FOR COALS.
SPECIFICATION.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 30,000 Tons of SOFT COALS and SOFT COBBLES or NUTS, to be divided into Three Contracts, of 10,000 Tons each, and to be delivered in the following monthly quantities—viz.:

		Tons.
1878	April	500
	May	500
	June	500
	July	600
	August	700
	September	900
	October	1100
	November	1100
	December	1000
1879	January	900
	February	800
	March	800
	April	600
Total of each Contract		10,000

The Company will undertake to receive from the party or parties contracting the total quantity of 30,000 Tons, in One, Two, or Three Contracts, as the Board may decide; but they do not bind themselves to accept the lowest or other tender or tenders, until after a satisfactory trial of the Coals and Cobbles or Nuts to which such tender or tenders may relate shall have been made. They are to be the best of their kind, and as free as possible from sulphur, bats, bind, refuse, dirt, and shall be weighed upon a correctly adjusted machine.
Payments will be made monthly, if, and so long as, the Contracts shall be duly fulfilled, to the extent of nine-tenths of the amount of the invoices, and the balance will be discharged on the satisfactory completion of the Contract.
Sealed tenders (to be made on forms obtainable at the Company's Office), specifying the description of Coals and the Pits at which they are to be raised, and stating the prices for delivery by canal at Derby, at the New Gas-Works adjoining the Midland Railway Company's premises, or at the Canal Wharf, and also the price delivered at either of the Midland Railway Stations, or at the Great Northern Station, Derby, and in manner and subject to the conditions aforesaid, must be delivered at the Offices of the Company, Friar Gate, on or before Saturday, the 30th day of March inst.
The respective contracting parties will be required to execute an agreement to be prepared by, and to the satisfaction of, the Secretary of the Company.
By order of the Directors,
ISAAC FISHER, Secretary.
Derby Gas Office, March 16, 1878.

BISHOP AUCKLAND GAS-WORKS.

THE Directors of the Bishop Auckland District Gas Company are prepared to receive TENDERS for the construction of a GASHOLDER-TANK, 93 ft. in diameter, to be erected on the site of their New Station, near Bishop Auckland.
Drawings and specifications may be inspected, and forms of tender may be obtained, on application at the Office of the Company in Bishop Auckland; and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Monday, the 18th day of March inst.; and tenders must be delivered at the Office of the Company, at or before Ten o'clock in the forenoon of Friday, the 5th day of April next.
The Company do not pledge themselves to accept the lowest or other tender.
WM. V. THOMPSON, Secretary.
Bishop Auckland, March 12, 1878.

BISHOP AUCKLAND GAS-WORKS.

THE Directors of the Bishop Auckland District Gas Company are prepared to receive TENDERS for the construction of a Telescopic GASHOLDER, 90 ft. in diameter, to be erected on the site of their New Station, near Bishop Auckland.
Drawings and specifications may be inspected, and forms of tender may be obtained, on application at the Office of the Company in Bishop Auckland; and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Monday, the 18th day of March inst.; and tenders must be delivered at the Office of the Company at or before Ten o'clock in the forenoon of Friday, the 5th day of April next.
The Company do not pledge themselves to accept the lowest or other tender.
WM. V. THOMPSON, Secretary.
Bishop Auckland, March 12, 1878.

SWANSEA, GLAMORGANSHIRE.

IMPORTANT SALE OF SWANSEA GAS SHARES,
Under the Powers of the Swansea Gas Act, 1861.

MR. JOHN MACK LEEDER begs respectfully to announce that he has been favoured with instructions to SELL by PUBLIC AUCTION, at the Mackworth Arms Hotel, Swansea, on FRIDAY, the 5th day of April, 1878 (subject to conditions of sale to be there and then produced, and in such Lots as shall be determined on), 330 NEW SHARES, of £25 each, in the Swansea Gas-light Company.
These Shares are issued under the authority contained in the 23rd section of the Swansea Gas Act, 1861, and are offered for Sale by Public Auction in pursuance of that Act.
The Shares will be offered in such Lots as to meet the convenience of all classes of investors, whose particular attention is respectfully directed by the Auctioneer to this safe and increasingly profitable property.
Sale to commence at 2.30 o'clock p.m. in the afternoon precisely.
Printed particulars may be obtained on application to C. NORTON, Esq., Solicitor, SWANSEA; the Secretary and Manager of the Company; or at the Auctioneer's Offices, Oxford Chambers, SWANSEA.

HYTHE, COLCHESTER.

TO BUILDERS, CONTRACTORS, GAS COMPANIES, AND OTHERS.

MESSRS. FENN & CO. have received instructions from the Contractor, upon the completion of the New Gas-Works and the Hythe Bridge, to SELL by AUCTION, at the Hythe, Colchester, on THURSDAY, April 4, 1878, at Eleven for Twelve o'clock, the whole of the PLANT and STOCK, as follows:—
7-horse power Portable Engine, by Clayton and Shuttleworth.
"Murray's" 16 inch Chain Pump, 30 ft. long.
7-in. Contractors Hand Pump, Crab, Joiners Cramp Sieves, &c.
30 complete sets of 16-in. by 16 in. D Mouthpieces, with Wrought-Iron Lids, Ascension-Pipes, Dip-Pipes, and 20-in. by 20-in. Cast-Iron Hydraulic Mains, in 6 ft. 6 in. lengths, with Covers and Stands.
20 Tons of old Cast Iron.
15 Tons of 5-6 10-in. Cast Piping, 130 new, and about 30 second-hand Pile Shoes.
3 Cast-Iron Tanks, quantity of Slide-Valves, Cast-Iron Guttering, Stack-Pipes, second-hand Round and Iron Gas Tubing, Bolts, Lead, Office Stove, &c.
60 Loads of Pitch Pine and Memel Timber. Quantity of 3-inch Deals and Plank, Boards of various thicknesses, Rafters, Quartering, Framed Roof Principals, Framed Doors, Sashes, Troughing, Slate, Battens.
1000 Scaffold Poles, Scaffold Boards, and Putlogs, Trestles, Mortar Boards, Centres, Ladders, Barrows, Roof Ventilators, Weather Boards, ¼-in. Rolled Plate Glass, Paint, and Colours.
30,000 nearly new Fire-Bricks, 7000 new ditto.
Quantity of Blue Staffordshire and White Suffolk Bricks, 18 in. and other sized Glazed Socket-Pipes, Ridge Tiles, Bath Stone, 3-in. York Coping, Door Sills, 3-in. Slabs, old Bricks and Slates, and numerous other Effects, which will be described in Catalogues.
The Auctioneers invite the attention of the Trade and Gas Companies to this important Sale. The whole will be divided into convenient Lots, and lie well for carriage, either by water, road, or railway.
Catalogues may be had in due time of the AUCTIONEERS, COLCHESTER and ARDLEIGH HALL.

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T. V. C. and Co. are buyers of Tar and Ammoniacal Liquor, also Spent Oxide. They confidently recommend a trial of their Oxide Paints at 26s. per cwt., and "Royal Mail" Lubricating Oil (equal to best lard or sperm) at 2s. 6d. per gallon. Black Varnishes from 8d. to 1s. 6d. per gallon.

COMMERCIAL GAS COMPANY.

NOTICE is hereby given that the next ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 5th of April, 1878, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, to elect an Auditor, and for other business.

The Books will be closed for the transfer of Stock from the 23rd of March inst. to the 5th of April next, both days inclusive.

By order of the Board,
E. J. SOUTHWELL, Secretary.
Offices, Stepney, March 6, 1878.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS holding, previous to the 31st of December last, £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 3rd of April, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 31st of December last, to elect Directors and Auditors for the ensuing year, and n other business.

The Transfer Books will be closed on and after the 13th March, and will be opened on the 4th of April ensuing.

By order of the Court of Directors,
ISAAC ADOLPHUS CROOKENDEN, Secretary.
70, Bankside, London, S.E., March 4, 1878.

Just published, price 2s. 6d.

THE LONDON WATER SUPPLY.

A monograph submitted to the Society of Medical Officers of Health, by CHARLES MEYMOTT TIDY, M.B., Professor of Chemistry at the London Hospital, &c.
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ANALYSES OF SCOTCH COALS,

CANNEL, SPLINT, SHALE, &c., USED in the MANUFACTURE of GAS. By WILLIAM WALLACE, Ph. D., F.R.S.E., F.C.S., &c., Public Analyst and Gas Examiner for the City of Glasgow.
LONDON:
WILLIAM B. KING, JOURNAL OF GAS LIGHTING Office, 11, BOLT COURT, FLEET STREET, E.C.

MR. EDWARD SANDELL,

Associate of the Society of Accountants in England,
Publisher of the
"Gas Companies Expenditure Journal,"
Begs to announce his REMOVAL from Skinner's Place, Size Lane, to
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Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.

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TO INVENTORS AND PATENTEES.

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NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

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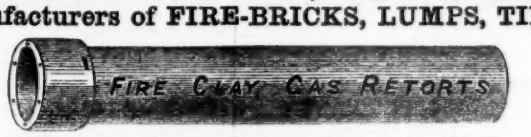

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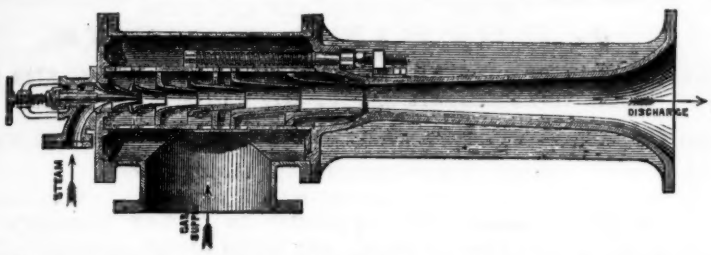

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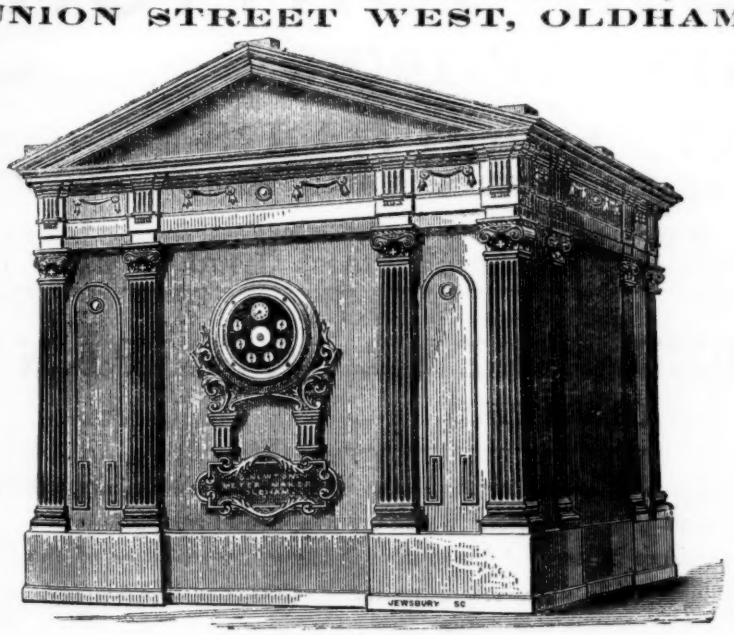

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CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

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WITH PATENT WHITE METAL PLUGS.

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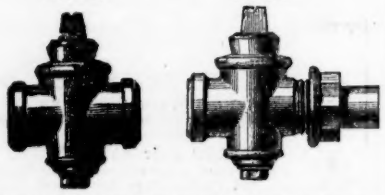

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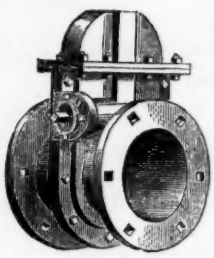

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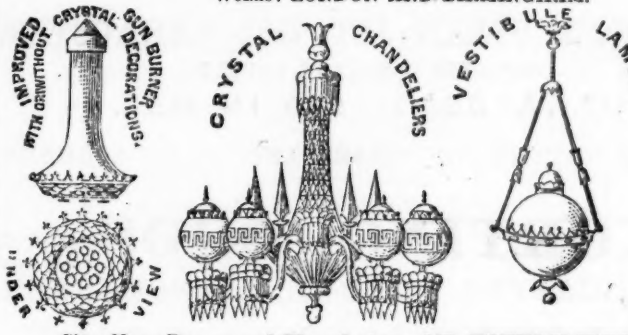

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"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

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It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

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They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

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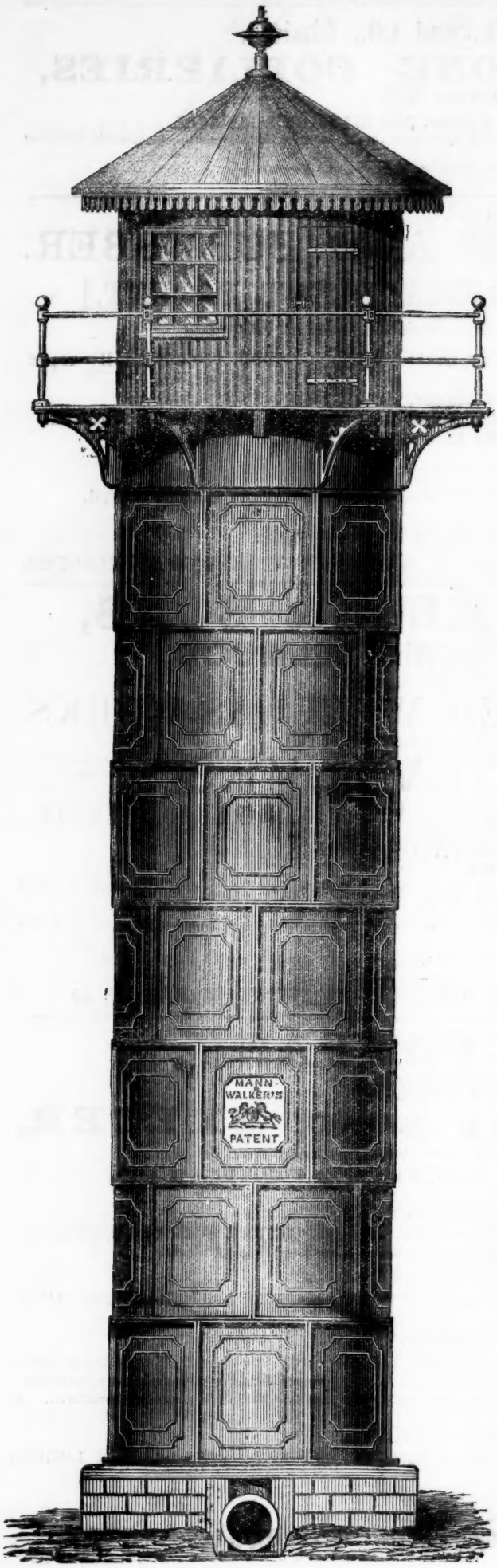

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By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im- portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,
148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
SOLE AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

EDWARD BROOKE & SONS,
HUDDERSFIELD,
MANUFACTURERS OF
GAS-RETORTS, FIRE-BRICKS, &c.

These Fire-Bricks have been used in the erection of Glass Furnaces for Thirty years, and have beaten all others; they do not contract or expand.

SMALL SAMPLE BOX SENT FREE OF COST.

GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS
BY THEIR
PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

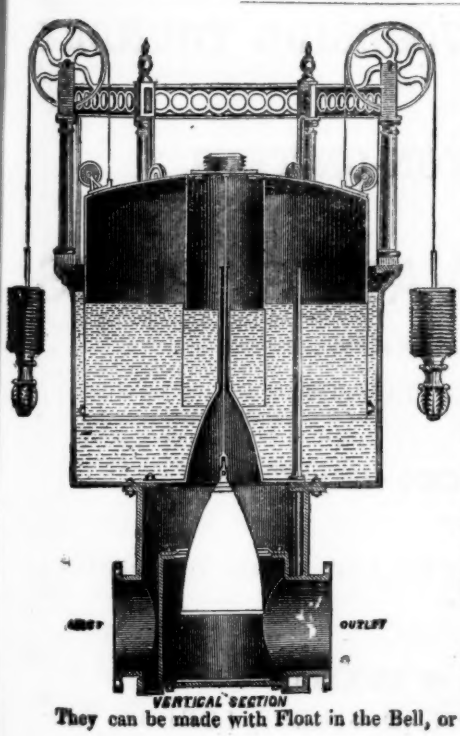
FOR SAMPLES AND TERMS, ADDRESS—
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY. LEEDS.

J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL
Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL
Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL
Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¼ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

FRASER'S
RIBBED IRON RETORTS
ARE
MORE DURABLE AND EFFICIENT THAN PLAIN CASTINGS.

They are in use at a large number of Gas-Works, giving universal satisfaction.

Apply to
R. THOMAS & CO., 40, Gracechurch St., LONDON,
OR
A. C. FRASER, Gas-Works, Barrow-in-Furness.

GRIRDROD'S PATENT
PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,
Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
LANCASHIRE.

JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

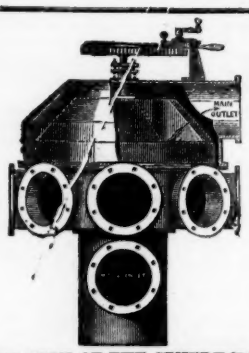
GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

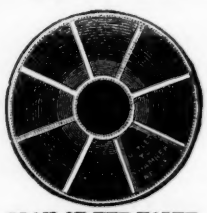
LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C.

GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

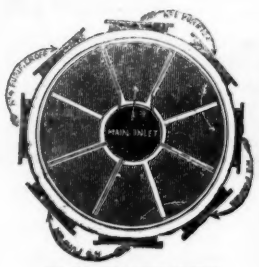
C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

THOMAS ALLAN & SONS,

IRONFOUNDERS.

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.
„ 1½ to 10 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 15s. from Glasgow.

AGENTS FOR LONDON AND THE SOUTH OF ENGLAND:

THE THAMES BANK IRON COMPANY, UPPER GROUND STREET, LONDON, S.E.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms,

And to treat, by Purchase or Exchange, for Spent Oxide.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.
July 2, 1877.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly,

"JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

CROLL'S

DRY GAS-METERS,

PRIZE MEDALS.

LONDON, 1851;
NEW YORK, 1853
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS

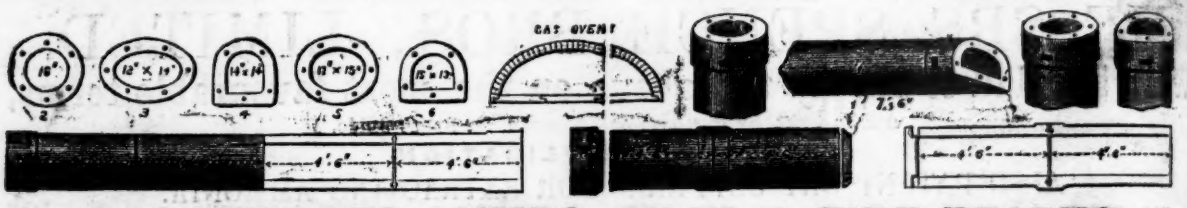
LONDON 1862;
DUBLIN, 1865;
PARIS, 1867

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

HARRIS & PEARSON,

FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.



GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

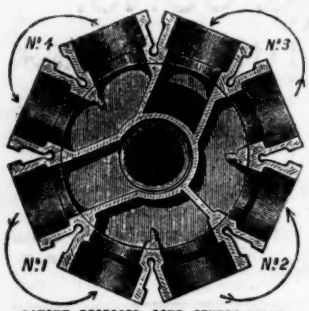
PATENT

RECESSED CONE CENTRE-VALVES,

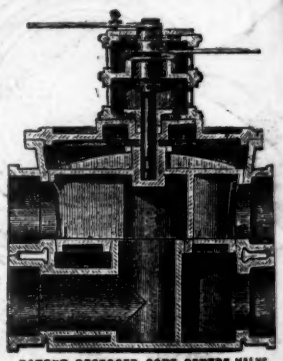
Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

LONDON OFFICE: 106, CANNON STREET.

D. HULETT & CO.

Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE 10s. each, net. Special quotations for large quantities.
Also made EXTRA STOUT recommended for its durability, PRICE 11s. 6d. each.

D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

PATENTEES OF IMPROVED WET AND DRY GAS-METERS.

Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

55 and 56, HIGH HOLBORN, LONDON.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 26, 1878.